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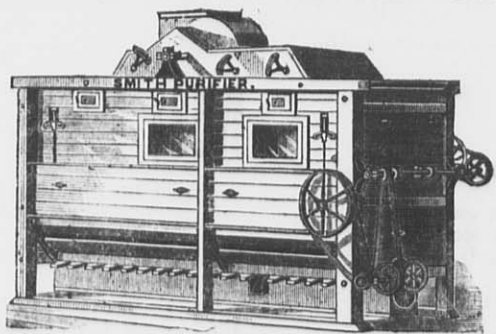
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A large number are in use in the successful New Process Mills of this country. We manufacture eight sizes, adapted to the smallest or largest mills. Our prices range from \$225 to \$600, and cover a license under all of the patents owned by the Consolidated Middlings Purifier Company. Send for our New Circular and price list with references. Address the Manufacturers,

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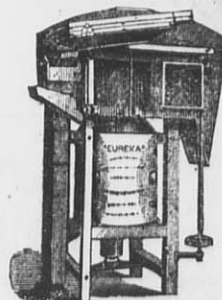
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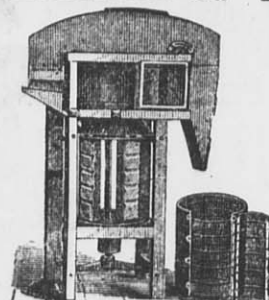
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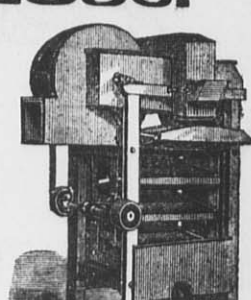
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Smut and Separating Machine.



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We continue, as heretofore, to manufacture in the best possible manner, the Wheat Cleaning Machinery here illustrated. On and after Jan. 1st, 1879, we will discount from our former prices of all our wheat-cleaning machinery 15 per cent, with an additional cash discount of 10 per cent if cash is paid in thirty days from date of shipment. We also keep full stocks of

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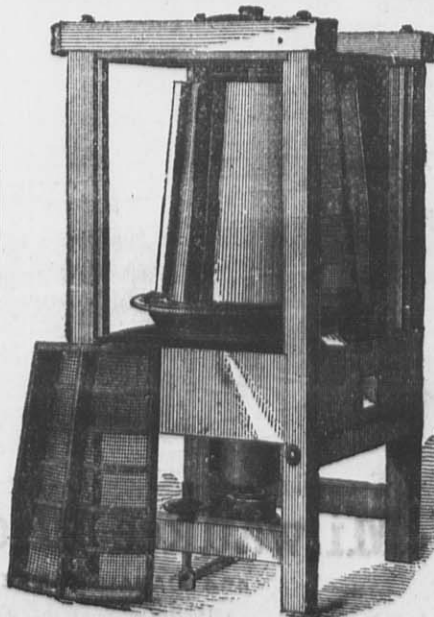
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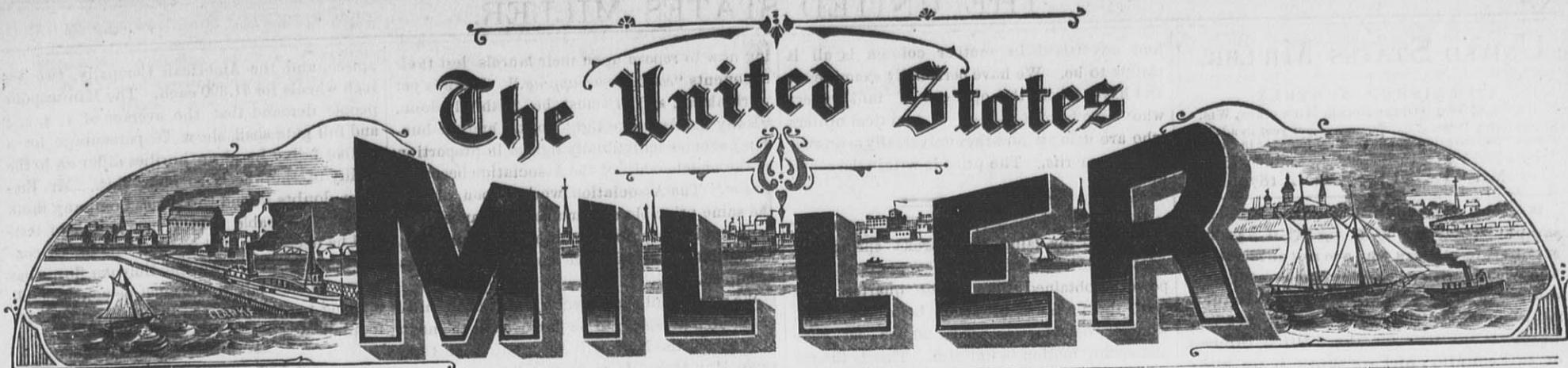
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Volume 6.—No. 6.

MILWAUKEE, APRIL, 1879.

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## REJOICE YE MILLERS!

For that "party by the name of Cochran" has been defeated.

The American Middlings Purifier Company  
vs. the Atlantic Milling Co. and  
Others, of St. Louis.

St. Patrick's day (March 17th) was a day of great interest to the millers of the United States, as the decision of the above entitled case commonly called "The Cochran Case" was to be decided. Accordingly many millers and their representatives, attorneys and members of the press were in attendance upon the opening of the United States Court on the morning of March 17th. The Court, having fully considered the case since the close of the trial, rendered the following decision, every word of which will be read with interest by the now happy fraternity of millers:

### THE DECISION.

On the 6th day of January, 1863, letters patent, numbered 37,317, were granted by the United States to Wm. F. Cochran, for "A new and useful method of bolting flour." The claims in the patent were as follows:

"First. Bolting the meal over a series of reels covered with cloths of increasing fineness in combination with a blast, substantially in the manner described.

"Second. Running the offal through the entire series of reels, substantially in the manner described for the purpose of making the flour bolt more freely.

"Third. Rebolting the 'white middlings' flour after regrinding, and mixing them with offal, substantially in the manner described.

"Fourth. Conducting the flour made upon each reel into a separate compartment, substantially in the manner described, for the purpose of making a variety of grades, or of mixing them in any proportion desired, as set forth."

On the 24th day of April, 1874, the above-mentioned patent was reissued, numbered 5,841, for "A new and useful improvement in the Art of Manufacturing Flour." The claim in the reissued patent was as follows:

"What I claim as my invention, and desire to secure by Letters Patent, as an improvement in the art of manufacturing flour, is: 'The hereinbefore described process for manufacturing flour from the meal of ground wheat, by first taking out the superfine flour, and then taking out the pulverulent impurities by subjection to the combined operations of screening and blowing, and afterward regrinding and rebolting the purified middlings.'"

The complainant is the assignee of the reissued patent.

The reissued patent was sustained by the Supreme Court in *Cochran vs. Deener*, 94 U. S. Rep. 780.

A motion was made in the Supreme Court to vacate that decree, because it was procured by collusion. The charge was not sustained; but in denying the motion, the Supreme Court said:

"Under the circumstances, we think that third parties, who had no opportunity of being heard, and whose interests, as opposed to the Cochran patents, are very important, should not be concluded from having a further hearing upon it whenever a future case may be presented for our consideration."

The defendants, in their respective answers, deny the validity of the reissued patent on various grounds, the more important of which is that such reissue is not for the same invention as that described and claimed in the original patent; and that the invention had been anticipated by others, and described in various publications and patents prior to 1863; and the defendants also deny the alleged infringement. Voluminous proofs were taken, accompanied with many diagrams, models and ex-

hibits. By consent of parties, the arguments were heard by the Circuit Judge and Judges Treat and Nelson.

Rodney Mason, Chas. F. Blake, C. H. Krum and others for the complainants; Geo. Harding, Gordon E. Cole, F. N. Judson and others for the defendants.

DILLON, Circuit Judge: The reissued patent is a process patent for an alleged new and useful improvement in the art of manufacturing flour. "The claim therein," as construed by the complainant, "is for the use of five consecutive steps performed in the art of manufacturing flour in a definite order, viz:

"First—Grinding the wheat into meal.

"Second—Taking out the superfine flour.

"Third—Taking out the pulverulent impurities by the combined operation of screening and blowing, so as to purify the middlings, which are then—

"Fourth—Regrind, and then—

"Fifth—Rebolted."

The real value of the invention described and claimed in the reissued patent, consists in the purification of the middlings by screening and blowing, thus freeing them from pulverulent impurities, and thereby fitting them to be reground into flour of superior quality. The mode described in the patent and accompanying model and drawing, for effecting the purification of the middlings, is by the agency of revolving bolts, acting upon the meal or "chop" as sieves or screens, assisted in their operation by blasts of air introduced within them. The claim of the complainant is that whenever, in the manufacture of flour, the wheat is ground by the first operation of the stones into meal so that superfine flour is by the next step of the process taken therefrom, any purification of the middlings in residual mass (of which the valuable constituent is the middlings) by the combined action of screening and blowing, immediately, for the purpose of regrinding and rebolting, whether such purifying is within the flour reels, or upon vibratory screens outside of reels, is an infringement of the Cochran patent.

Four made from purified middlings is now, and since about the year 1871 or 1872 has been, well known throughout the country as "new process" flour. In what consists the essential value of this "new process?" The answer is, purified middlings, that is, the making of a first grade or even the best grade of flour out of middlings, from which it had generally been considered by the millers of this country (although more intelligent or advanced ideas prevailed in France, and perhaps elsewhere in Europe), unprofitable to produce, or at all events, impracticable profitably to produce flour of the first quality.

A fundamental question in the cause, underlying all others, is: Did Mr. Cochran in his original patent, granted January 6th, 1863, contemplate, or provide for, the purification of middlings by the combined action of the screen and blast? If he did not, the reissue, which must be for the same invention, or the original patent, and which makes the basis of its claim such purifications of the middlings, is void.

In the light of arguments of great ability and thoroughness, extending over a period of fifteen days, and illustrated at every step by exhibits, diagrams and models, the judges who sat at the hearing have deliberately considered the question above stated, and have reached an unanimous conclusion upon it.

It becomes my duty to announce the judgment of the Court. I shall content myself with stating it, without displaying in detail the reasons, or elaborating the grounds upon which it rests.

The description of the invention in original patent as a "Method of Bolting Flour," the progressively finer meshes in the three bolting reels therein described; the absence of any "re-turns;" the statement therein that the agency of the blast is to "assist the bolting;" the

cupola or dome on the model, provided with screens, which could have no other effect than to arrest the impurities, or the most of them, and return them directly to the flour; the enforced circuit of air containing any impurities that might escape the screens in the cupola and returning the air under the conditions specified, laden with such impurities directly into the reels; the absence of any statement in the patent of a purpose to purify middlings; the absence of any claim for purifying middlings; the statement that air is used to "aid bolting," and the obvious consideration that if air was used to purify middlings, it could not fail to have occurred to so ingenious a mind as Mr. Cochran's that this could be most easily and most effectively applied, as it is now almost universally applied, outside of the reels or bolts, and not within them; the failure to provide for blasts of air in the "separator," or in a separator; the low grinding which his process evidently contemplated, as evidenced by the successively finer meshes; the fact now established that the manufacture of middlings flour is not practiced without more or less high grinding, or higher grinding than was ordinarily used in this country—the foregoing considerations, in connection with the extrinsic testimony as to what was done under the patent, all concur to satisfy us that the idea of Mr. Cochran was the use of the blast in the reels as an aid in the mere process of bolting, with the view of obtaining an increased quality of choice flour, and not for the production of purified middlings. The reissued patent having been expanded to embrace a claim for purifying middlings, when no such process was described, suggested or claimed in the original patent, it is void. If this conclusion is sound, it is not necessary to consider the questions of anticipation or infringement, upon some of which, if compelled to decide them, we might not agree. The result is that the bills must be dismissed, and decrees will be entered accordingly.

Decrees accordingly.

Treat and Nelson, J. J., concur.

### JUDGE NELSON'S OPINION.

NELSON, J.—I concur in the opinion of the Circuit Judge. The actual invention of Cochran has been enlarged by the addition of new matter in the reissue, so that when the two patents are compared the extension is apparent. The new patent is not for the same invention secured and embraced in the original letters patent.

Succeeding the delivery of the foregoing decision Judge Dillon stated that Judge Treat had also prepared a concurring decision, which Judge Treat then read.

### JUDGE TREAT'S OPINION.

I concur in the opinion just delivered by the Circuit Judge. The reissued patent No. 5,841 is not for the same invention as patent No. 37,317, and is consequently void. In addition to the summary of reasons just announced for the conclusion reached, it seems advisable to state that the original patent was merely for an improved method of bolting, in the manner described, whereby an increased quantity of choice flour could be obtained from the ordinary process of milling, without any reference to purified middlings, by combined blowing and screening in an intermediate, or any other stage of the operations.

The original contract of Cochran in 1860 with Warder & Barnett shows that his purpose was, by low grinding, to produce a superior grade of flour in larger quantities than theretofore known. He agreed to make "the most superior grade of flour in the United States out of four bushels and twelve pounds of choice wheat for each barrel of flour," which result could not be accomplished, except by low grinding, if at all. His scheme or plan did not contemplate a large amount of middlings, and could not have done so for the lower the grinding the less the quantity, and as a general rule the poorer the quality of

the middlings. At the time said contract was made, Cochran had an interest in the Cogswell & McKiernan patent, the devices of which he evidently designed to utilize. His experiments at Lagonda, and subsequently at the first Barnett mill, also show that his purpose was to produce a large amount of such choice flour, by low grinding, from the least possible, or a comparatively small, quantity of wheat. The early experiments were directed to that end; and hence the satisfaction evinced when the required amount of flour was produced approximately from the designated amount of wheat.

When, however, it was ascertained that no grade of good middlings flour could be thus made, the resort was had to higher grinding, of which, as the result, Warder & Barnett complained, as being one-quarter too much. They prove by their correspondence at the time, just as the original patent shows, that the inventor supposed that by his process and devices for bolting, he could accomplish his purpose by using the ordinary process of milling.

This is evident, not only from the correspondence at the time, but from the mechanical inventions to which he referred, and also from the special stress placed on meshes of increasing fineness.

In that correspondence there was a constant boast of the new mode of bolting whereby the meshes were to be kept cool and free from clogging, etc., and also of the device for returning the current of air through the cupola back into the reels whence it had just escaped through the perforated pipes, meshes, etc.

In one of the letters it was confidently claimed, that the difficulties as to low grinding even of spring wheat, could be overcome by Cochran's contrivances; that grinding of even that class of wheat could not be so low as to prevent "clearing up." It was low grinding then whereby the large quantity of choice flour was to be made, that the inventor had in view.

This was to be effected, not by an "intermediate" stage of purification, between the production of superfine flour and the regrinding of middlings, but by the use of meshes of increasing fineness in the flour bolts, assisted by blasts of air.

Those blasts of air were to spend their force within the first three reels; for no blasts were to be used in the separator before regrinding. The necessary effect of using successively finer meshes, instead of successively coarser was to prevent the escape through the meshes of a larger quantity of impurities; and consequently of making the flour thus screened cleaner and better. The impurities thus prevented from passing through the screens into the flour would necessarily be retained in the reels and pass off with the tailings, consisting of middlings, shipstuff, etc.

It is not to be supposed that meshes of increasing fineness could operate in any other way. Hence, the Cochran process was not to purify the middlings or increase their quantity or quality, but merely by "improved method of bolting" to obtain a larger amount of choice flour from the specified quantity of wheat.

In his original patent, No. 37,317, he formulated four claims, not one of which was for purifying middlings, but two were specially directed to his mode of "bolting." He especially stated that the flour screened through each of his first three reels could be kept separate or mixed, as the miller might desire, without a hint that the siftings of the third reel would consist of dirty flour or pulverulent impurities, not fit to be used, or which it was sought to remove, either from the flour thus sifted through the third reel or from the middlings within that reel which were to pass off with the tailings.

The devices specified in the original patent are very significant on this point. They pro-

[Concluded on page 91.]



## UNITED STATES MILLER.

PUBLISHED MONTHLY.  
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MILWAUKEE, APRIL, 1879.

We send out monthly a large number of sample copies of **THE UNITED STATES MILLER** to millers who are not subscribers. We wish them to consider the receipt of a sample copy as a cordial invitation to them to become regular subscribers. We are working our best for the milling interest of this country, and we think it no more than fair that our milling friends should help the cause along by liberal subscriptions. Send us One Dollar in money or stamps, and we will send **THE MILLER** to you for one year.

## THE OFFICIAL CALL.

We have just received on the eve of going to press the official call for the next meeting of the Millers' National Association, which reads as follows:

MILLERS' NATIONAL ASSOCIATION.  
PRESIDENT'S OFFICE, ST. LOUIS, May 28, 1879.

The Sixth Annual Convention of the Millers' National Association will be held at the Grand Pacific Hotel, in the city of Chicago, May 13, 1879. All members of State Associations and individual members of the Millers' National Association in States where no State organization exists are invited to be present. The ratio of voting, as decided by the Executive Committee, will be based upon the number of runs of buhrs on which assessments have been fully paid up to the 1st inst.

As recommended by the Executive Committee, a reorganization of the Association will probably take place, and it is hoped as many members as possible will attend.

GEORGE BAIN, President.

FRANK LITTLE, Secretary.

The Executive Committee are requested to meet at the Grand Pacific Hotel at 10 a. m., May 12.

J. A. CHRISTIAN, Chairman.

It is to be hoped that there will be a rousing turn-out of millers from all sections of the country, and especially from the Great Northwest.

THE Minnesota Millers' Association is officially called to meet at Minneapolis April 8th, 1879.

We have received a very interesting article on the milling industry in Hungary, which we are obliged to omit this month for lack of space.

AN INVITATION.—We cordially invite all millers, millwrights, millfurnishers and inventors of milling machinery to call on the UNITED STATES MILLER when visiting this city.

S. H. WILLARD & Co., of 45 South Clinton street, Chicago, Ill., have purchased *The Millers' National Magazine*, originated by Messrs. Collins & Gathmann, manufacturers of the Garden City Middlings Purifier.

AN immense quantity of flour manufactured in Minnesota is for direct export to Great Britain. It is put up in sacks containing 140 pounds each. This trade has been rapidly growing during the past winter.

MISS MAGGIE KERN, daughter of the well-known Milwaukee miller J. B. A. Kern, was married March 25th to Mr. Ferdinand Meinecke, also of Milwaukee. The happy young couple have gone to Florida to spend the honeymoon.

**THE UNITED STATES MILLER** has the largest circulation of any milling journal published in America, and was the first milling journal started in America entirely independent of connection of interest with some machine or mill-furnishing establishment.

HENRY HERZER, the mill-pick manufacturer and dresser, reports business lively since he moved into his new location, No. 456 Canal street. He is in daily receipt of orders from all parts of the West, and his work gives universal satisfaction. Milwaukee millers would not like to do without him.

We were pleased to receive a call, March 27th, from Charles Gratiot, of Gratiot Bros., manufacturers of wheat heaters in Platteville, Wis. He reports business first rate, and that they are crowded with orders. Charlie holds his weight yet—which is considerable—and is, as ever, one of the best-natured men in the business.

WM. LEHMANN'S invention for truing the faces of millstones, which our readers will

find advertised in another column is all it claims to be. We have personally examined it and have asked the opinions of mill-owners who have bought it, and of practical millers who are using it, and they universally acknowledge its merits. The price is within the reach of all.

**HAFNER'S MODEL MILL.**—The dynamometer shows that by using the Eureka spring and friction clutch on bevel gear 38 per cent more power is obtained than by the quarter twist belt, the pressure of steam being the same; whereas, belt motion varies 20 per cent, gear and spring motion is uniform. This is the result of tests made by Sigismund Low, late Chief Engineer of the Northern Pacific R. R.

**MESSRS. GANZ & Co.**—We respectfully call the attention of our readers to the large advertisement of Messrs. Ganz & Co., mill and milling machinery builders, in Budapest, Hungary. This firm have met with great success in introducing their rolls in other countries, and they deserve the attention of our millers. Letters may be addressed to them in either the English, German, or French languages. Postage on letters to Hungary is five cents, and on newspapers or circulars two cents, which must be prepaid.

Mr. Robert Nunnemacher, of the Milwaukee milling firm of Nunnemacher & Co., has just arrived in New York on his return from Europe. He spent some time in Budapest and other important European milling centres, examining the milling machinery and methods in use there. It is a curious coincidence that at the very time Mr. Nunnemacher, Mr. Gray, and other millers from the United States were in Pesth examining the Hungarian machinery and methods that several mill-owners from Pesth were in Milwaukee to examine our American machinery and methods. Verily, millers on both sides of the Atlantic are really becoming not only willing but anxious to learn of each other.

## PATENT SUITS AND MILLERS' ASSOCIATIONS.

The year 1879 appears to be disastrous to plaintiffs in patent right suits, especially in some very noted cases. The Woodbury patent case, in which all the planing mills in this country were interested was decided in the United States Circuit Court for Massachusetts in the month of February in favor of the defendants, and consequently there was great joy amongst the planing-mill men. Now the great "Cochrane case," which has so long been the subject of hope and fears amongst the millers has been decided in favor of the defendants, and great is the joy thereover. We stated in our last number that we did not think that this latter case would be appealed, no matter which way it was decided. We did not think it would as certainly the three able Judges who sat on the case would undoubtedly render a decision which would not be altered by the Supreme Court of the United States, and we do not think, now that the decision is rendered, that the plaintiffs will gain anything by the appeal. The decision is unanimous and clear, and the great question at issue is practically ended. There are two things to be deplored in connection with this case, and those are: First, that so many millers have held aloof from joining the Associations and contributing towards winning this important case, for, as sure as the sun shines, so sure would every new process miller in this country have been liable to pay royalty to the Cochrane party if this case had not been ably defended. The non-contributing millers will now have the pleasure of enjoying the fruits of the labors of their more generous and energetic brethren. The second disagreeable feature is the compromise during the trial by Messrs. Stanard and Kehlor with the plaintiff. This last matter is too bad to talk about. The address of the Executive Committee—published last month—to the millers of the United States, professing to reorganize the National Association on a thoroughly legal and business basis appears to meet with very general approval, and it is to be hoped it will be practically and successfully carried out. There are other important cases, notably the cases of the Consolidated Middlings Purifier Company vs. Griffin, of Buffalo, N. Y., and the Denchfield suits. That these must be ably defended there is no doubt, as the plaintiffs have exercised the greatest shrewdness and secured unquestionable legal talent to conduct the prosecution of the cases. Vigorous means must, therefore, be used by the defense to overcome the dangers threatened. It is to be hoped that millers universally will take more interest in the Association. Millers must not be will-

ing now to repose upon their laurels lest their opponents "catch them napping." There is yet work ahead, and it must be faithfully done. "Many hands make light work," and the burden becomes individually lighter in proportion as the membership of the Association becomes larger. The Association works upon almost the same principle as a mutual insurance company, and its members will be the gainers in all patent cases whether contested or compromised.

We would call the especial attention of millers to *Article Seven*, to be proposed at the next meeting of the National Association at Chicago, May 13th. It reads as follows:

Seventh—That all patents considered by the Executive Committee to be valid and useful should be compromised for the benefit of all full-paid members of the National Association who may choose to avail themselves of the terms of such compromise, that the fullest possible encouragement should be accorded honest inventors, whose machinery will improve our manufacture, by arranging for moderate terms, alike bearable to users and remunerative to inventors; but that all fraudulent claims should be fought to the bitter end regardless of expense.

This should be acceptable and entirely satisfactory to both patent-right owners and mill owners.

## THOSE LITTLE MILLS.

Never since the advent of middlings purifiers in the Northwest has there been so much interest awakened as has been evinced in the past two months over the little mills made by the Milwaukee Middlings Millstone Company of Milwaukee. When Jonathan Mills first brought them before the milling public it of course created considerable talk, but comparatively few had sufficient faith in the departure to invest their money in *experimenting* with them. The Milwaukee Milling Company, a stock company organized for the manufacture of flour, however, were so well satisfied with the experiments made that they were willing to build a mill in which the Jonathan Mills' little mills were to be used entirely—the 16-inch stone for granulating the wheat, and the 24-inch for grinding the middlings.

Many skeptics predicted a grand failure of the enterprise, but now—that a mill has been built containing 37 run of these stone which work so entirely to the profit and satisfaction of the stockholders that they are about to double its capacity by adding from 33 to 40 more runs—they are filled with wonder, and are bound to confess to quote the language of one of them that "this ere thing does work after all."

Millers from Minnesota, New York, Michigan, Ohio, Indiana, and even from the New England States, have visited this city during the past three months to see this mill in operation, and all are obliged to confess that the work turned out is as good as can be done. Visiting millers are surprised to learn that no "red dog" or "superfine" flour is made in this mill. The two brands made are "Patent" and "Standard Straight," which demand the highest prices in the city trade and the New York and English markets. The mill is now turning out steadily over 350 barrels per day, which is claimed to be produced at a less expense than in any other Milwaukee mill. Visitors to—as well as the stockholders of this mill are now thoroughly convinced that the great success of this mill is mainly due to the accurate and precise workings of the little grinding mills used. The Milwaukee Middlings Millstone Company have during the past month closed several contracts for building new or refitting old mills entire with this modern little wonder, which seems bound to crowd out of use the old-fashioned, large and cumbersome millstones.

## A WATER WHEEL TEST.

The city water works of Minneapolis, Minn., which lately advertised for two turbine wheels, of 300-horse power each, to pump water into their reservoirs, decided to have the contesting wheels tested at the Holyoke flume in the Connecticut River, before April 1st by the engineers of the Lawrence Water Power Company. The wheels to be tested are the "Risdon," the "Swain," the "American" and the "Victor." The Holyoke Machine Company representing the "Hercules" wheel, and the Ames Company representing the "Boyden" were both a day too late in applying and so are shut out; but in case the contesting wheels fail to "toe the mark," there will be a new trial, to which all will be admitted. The Ames Company intend in that case to test their Boyden wheel at the Holyoke flume for the first time, which will necessitate putting in a "quarter turn."

The Risdon agent offered two of his 60-inch wheels of 375-horse power each for \$2,100 apiece; Swain, two 34-inch wheels for \$3,000

apiece, and the American Company, two 48-inch wheels for \$1,300 each. The Minneapolis people demand that the average of  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and full gate shall show 76 percentage for a 30-foot fall. Local authorities differ as to the ability of the wheels to show this. Mr. Emerson doubts it, and the Ames Company think it highly probable that a new series of tests will be necessary. This trial will be of considerable interest. As the Holyoke flume has only a 20-foot fall, there must be considerable figuring to show the required results for a 30-foot fall.

## A NEW THEORY ABOUT FOOD.

A German physician has started a new theory with regard to food. He maintains that both the vegetarians and the meat-eaters are on the wrong track. Vegetables are not more wholesome than meat or meat than vegetables, and nothing is gained by consuming a compound of both. Whatever nutritive qualities they may possess, he says, is destroyed in great measure and often entirely by the process of cooking. All food should be eaten raw. If this practice were adopted, there would be little or no illness among human beings. They would live their apportioned time and simply fade away, like animals in a wild state, from old age. Let those afflicted with gout, rheumatism and indigestion, try for a time the effect of a simple uncooked diet, such as oysters and fruit for instance, and they will find all medicines unnecessary and such a rapid improvement of their health that they will forewear all cooked articles of food at once and forever. Intemperance would also, it is urged, no longer be the curse of civilized communities. The yearning for drink is caused by the unnatural abstraction from what are termed "solids" of the aqueous element they contain—uncooked beef, for example, containing from 70 to 80 per cent, and some vegetables even a larger proportion of water. There would be less thirst, and consequently less desire to drink, if our food were consumed in its natural state without first being subjected to the action of fire. Clothing, our adviser also thinks, is a mistake, but he admits that the world is not yet far enough advanced in civilization to go about undressed. Whatever differences of opinion may exist as to this anti-cooking theory, there cannot be a doubt that in getting rid of the kitchen with all its abuses—including the cook—housekeepers would be spared a vast amount of worry, and probably on this account alone would live to a greater age than at present.

A new steam mill is to be built at Olivia, Minn.

Messrs. Hoyt & Seager of Frontinac, Minn., are about to build a flour mill. It will contain four run of stone and two sets of rolls.

Volk's flour mill at Wilmot, Wis., burned March 14th with most of the contents. Loss, \$12,000; no insurance. One man lost his life in trying to get the safe out of the office. His name was Emery Whapples.

March 31st, we were favored with a call from Mr. Herman Notbohm, of Notbom Bros., Janesville, Wis. Mr. Notbohm was on his return from a short trip to St. Louis. He reports the milling business not lively but yet satisfactory.

A. A. Freeman & Co.'s big mill at LaCrosse, Wis., thoroughly fitted out with all the modern improvements, has now a capacity of 500 barrels per day, and additions of machinery are now being made which, when completed, will increase its capacity to 750 bbls. per day.

The City Flour Mills of Minneapolis, Minn., burned on the morning of March 30th. Loss, \$70,000. Small insurance. The fire caught from the smoke stack of an adjoining mill. Minneapolis has been extremely unfortunate in the destruction of flour mill property during the past year.

F. W. Stocke, of Hillsdale, Mich., is putting in his mill eight of the Jonathan Mills' millstones, also two 8-reel bolt chests, Smith Bros., Milwaukee, are doing the millwright work. Mr. Stocke has already in his mill nine run of the 4-foot stone, and, with the new additions, he will soon have seventeen run in full operation.

March 18th, a reissue of an old grain-cleaner patent was made from the United States Patent Office. It is said that it has some bearing on the middlings purifier suits. We are informed that it is owned by the Consolidated Middlings Purifier Co., of Jackson, Mich. We will examine the matter, and, if it is of sufficient importance, will describe it with illustrations next month.

## Special Business Notices.

Do you need a good Saw Gummer or Saw Tooth Swage? If so write to J. W. Mixer & Co., Templeton Mass. Agents wanted.

NOTICE.—Owing to the death of Mr. Edward Harrison, we take this method of informing you that the business will be continued until further notice, and that all orders will receive prompt attention. Letters should be directed to the "Estate of Edward Harrison," New Haven, Ct.

IMPORTANT NOTICE TO MILLERS.—The Richmond Mill Works and Richmond Mill Furnishing Works are wholly removed to Indianapolis, Ind., with all the former patterns, tools, and machinery, and those of the firm who formerly built up and established the reputation of this house; therefore, to save delay or miscarriage, all letters intended for this concern should be addressed with care to Nurdyke & Marmon Co., Indianapolis, Ind.



## SCIENTIFIC CONVERSATION IN A EUROPEAN HOTEL.

## A Humorous Account of the Primitive Method of Transporting a Mill-Stone in Germany.

[Translated from the German.]

Mr. Sigismund Low, a prominent civil engineer of the United States, while traveling in Germany for the purpose of scientific research, met a former college friend, Baron Wuertemau, at Heidelberg, with whom, after discussing various applications of technical science, he had the following conversation:

Sigismund Low—"My nephew wrote me, before I left America, that any information I might be able to give him relating to the latest and best improvements in American mill machinery would be of special service to him."

Baron Wuertemau—"Pardon the interruption, Mr. Low; but many millers who have visited America tell me that of the large number of improved American machines very many have to be thrown aside as useless."

S. L.—"That is quite true; there are many worthless machines put into the market, but in a majority of cases the fault is with the miller and not in the machine."

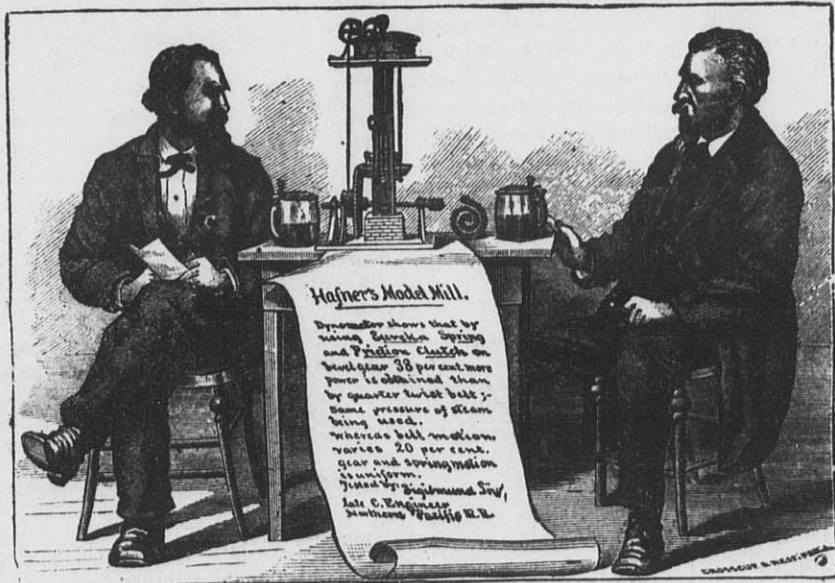
Baron W.—"How so?"

S. L.—"Well, I have seen stately palace-like buildings fitted up in the most elegant style from grinding floor to roof, built apparently to be ornamental rather than useful, while the most important part—the pit gear—runs as if intended to grind bones or cement. Any variation of motion, however slight, will make a burr quiver or wobble, causing rapid changes of the relative positions of the grinding surface, and thus grind too fine at some points and too coarse at others. If the action of the stone is thus defective all the improved machinery in the mill will not remedy the effect

identical with the native Germans of Hutzewald, on the Rhine. By the way, have you ever heard the Hutzewald anecdote?"

Baron W.—"I know the Hutzewalders are a good, honest, industrious, but slow people, who are adverse to any innovations or improvements, but I have not heard the anecdote."

S. L.—"Well, these people decided to build a mill. They quarried and cut a mill-stone from the hill, three hundred feet above the mill site, and were at a loss to know how to get it down. They decided to let it roll down, but, unfortunately, it turned to the left and ran down a ravine. After several days' diligent search they found it in a thicket, one and a half miles from the mill. Simply recognizing the fact that the blunder was made in not giving it a proper start, they, with great difficulty, carried it to the top of the hill from which it was started. Lest it be lost again, one of the party put his head through the eye of the stone, intending to accompany it down the hill in this manner, and in case it departed from the intended course, he promised to whistle, that the others might find it. Hannes (who in his younger days had been hostler in an artillery corps), with the air of a military expert, proceeded to make a reconnaissance of the field, and aimed the stone direct for the mill door, gave the command, 'Fire!' and off they let it go. The weight of a man on one side, of course, caused the stone to rapidly change its course, and man and stone went crashing through bushes and trees, finally landing at the bottom of a small lake. The parties on the hill vainly waited for a signal!—vainly searched for the stone. After carefully considering the matter, they concluded that the man, considering the stone of considerable value, had run away with it! There-



DISCUSSING AMERICAN MILLING IN EUROPE.

produced by this evil. Let me tell you of a model mill I saw which combines improvements on this vital part of mill machinery. I had heard a great deal of the celebrated model mill built by Mr. Hafner of Pittsburg, Pa., and therefore stopped at that city to see it. I was really astonished at the number of ingenious improvements and sound practical ideas combined in so small a compass, among the most important of which are the Eureka coil spring and Eureka friction clutch, which are also important improvements for threshing machines driven either by horse or steam power. Mr. Hafner has certainly reduced the study of springs to a science, as, in addition to his celebrated springs he has invented a clock which has run continuously one year without re-winding. I made a number of tests with the model mill, and it exceeded my most sanguine expectation. I purchased this duplicate model for my nephew."

Baron W.—"Why is it that belt motion should vary twenty per cent?"

S. L.—"That is easily explained. A belt is merely a transmitter, and not a reservoir or equalizer of power, and if there is any variation in the motion of the driving pulley it is transmitted to the spindle pulley, and consequently to the stone."

Baron W.—"If so many American millers build steam mills upon a plan which actually loses thirty-eight per cent of power why do they make so much ado about the gain of two or three per cent by water wheel?"

S. L.—"Thousands of millers throughout the United States have seriously considered this question, and as a result, they are rapidly adopting the Eureka spring and Hafner's system, which absolutely saves this 38 per cent of power by reducing the friction and equalizing the motion. In fact, these improvements have been adopted everywhere in the States, except in a small community of Pennsylvania Dutch, who are, in their characteristic slowness,

fore, the Burgomeister was authorized to publish the following: 'Reward!!! Five thalers vil becomen to de man as vil arrest eine Deutchman mit eine mill shtone around mit his head.'"

## IMPORTANT NOTICE.

TO THE PARTY RECEIVING THIS PAPER WHO IS NOT ALREADY A PAID SUBSCRIBER.

We hereby extend to you a cordial invitation to become a subscriber to the UNITED STATES MILLER. We shall endeavor to make it of the greatest possible use and benefit to the milling fraternity, and no mill should be without it. The best talent that we can obtain in this and other countries will contribute to its columns, which will also be enriched by carefully translated articles on subjects of interest to the craft. Subscription price, \$1. Enclose money or stamps in an envelope, seal carefully, and send at our risk. By return mail you will receive a receipt therefor. Address

THE UNITED STATES MILLER,  
Milwaukee, Wis.

The mill of J. Bauholzer & Son, at Shelby, Ind., is being placed on a footing with other first-class mills in the vicinity, and the buhrs, purifiers and bolt-chests for same being furnished by the Nordyke & Marmon Co., of Indianapolis, Ind.

The mill of Addney & Witt at Lebanon, Ind., is undergoing important changes under supervision of Nordyke & Marmon Co., of Indianapolis, Ind. Two additional run of buhrs, iron hursts, bolt chests, purifiers and elevators are being furnished and set up by the manufacturers.

The mill of Lennon, Reynolds & Co., of Pannora, Iowa, formerly built by Nordyke & Marmon Co., of Indianapolis, Ind., is now being enlarged to a four-run mill, and the new process is being adopted, all of which is under construction at the works of the original builders.

## EVERYBODY READS THIS.

## NEWS OF THE WORLD.

ITEMS GATHERED FROM CORRESPONDENTS, TELEGRAMS AND EXCHANGES.

Kansas farmers are sowing wheat.

George Patlow, the miller at Grand Rapids, is dead.

C. G. Rogers, miller, at Sandy Lake, Pa., has failed.

Minneapolis coopers made 560,000 barrels during 1878.

Jas. A. Martin, miller, Roseville, Ohio, reported failed.

Wheat sells at Greeley, Colorado, for \$1.45 per 100 pounds.

Ellwood & Armstrong's mill at Rochester, N. Y., burned.

Joseph B. Enos & Co., Waterford, N. Y., millers, suspended.

Americus, Lyon county, Kansas, is to have a new flouring mill.

More wheat will be sown in Minnesota this year than ever before.

Geo. Farmer & Son's flour mill at Vestaburg, Mich., burned.

T. H. Vandercook, of Waukesha, has removed to Edgerton, Wis.

Messrs. Weller & Waldo, of Salem, Oregon, have sold their flour mill.

Hatch & Rogers, millers, of Chelsea, Mich., have dissolved partnership.

George T. Enos & Co., merchant millers, Buffalo, N. Y., have suspended.

Hammond & Noble, of Fostoria, Ohio, millers, have dissolved partnership.

The water is now sufficient to run all the Minneapolis mills to their full capacity.

Amos E. Whitson & Son, millers, of New London, Pa., have made an assignment.

The Atherly saw and grist mill at Orrillia, Ont., burned March 10th. Loss, \$25,000.

Betts, Miller & Snyder Bros., millers, at Bettsville, Ohio, have dissolved partnership.

A Mr. Marshall is building a flouring mill three miles from Stockton, Rooks county, Ks.

Thirty thousand acres in Los Angeles county, California, will be sown to wheat this year.

The assignment of Mrs. Lillia W. Hurd, owner of the flour mill at Decatur, Ill., is announced.

J. H. Keedy's flour mill at South Bend, Ind., burned March 7th. Loss, \$20,000. Insurance, \$9,000.

Barr & Thorne's flouring mill at Auburn, N. Y., burned March 18th; loss, \$40,000; insurance, \$24,000.

Edward P. Allis & Co. have received an order from England for fourteen of their belt porcelain roller mills.

The Reliance Works of Edw. P. Allis & Co. are running day and night on orders for engines and roller mills.

The millers of Devon County, England, have organized an association which promises to be an important one.

P. J. & J. B. Ferschweiler have purchased the flour mill at Newellville, Oregon, from John D. & Fred Hurst.

James Bedle & Son, millers, of Keyport, N. J., are reported to have made an assignment for the benefit of creditors.

Eighty-four thousand six hundred barrels of flour were made at Red Wing, Minn., for the year ending Feb. 1st, 1879.

The Milwaukee Middlings Millstone Company are building a 5-run mill at Auoka, Minn., for Messrs. Mayall & Owen.

B. D. Sprague, owner of the flour mill at Rushford, Minn., purchased from farmers in one week over 5,000 bushels of wheat.

Feb. 27th, the steam mills at Monticello, Iowa, were burned to the ground. Loss total, and put at \$12,000; insured for \$15,000.

The Milwaukee Middlings Millstone Company are furnishing twelve 16-inch mills to Mr. Frederick Stook, of Hillsdale, Mich.

M. Barbour, of the firm of Graham & Barbour, owners of the Jackson Mills at Carbonale, Ill., is dead and the firm has failed.

Messrs. Coleman, Jackson & Co.'s flour mill at Centralia, Wis., is being refurbished by the Milwaukee Middlings Millstone Company.

Todd, Reed & Stevens, of La Gro, Ind., are having buhrs and fixtures placed in their mill by Nordyke & Marmon Co., of Indianapolis.

The Government recommends municipalities throughout the island of Cuba to open schools for the education of the colored people.

The Red Wing and Lagrange mills, at Red Wing, Minn., shipped 28 car loads of flour in sacks to Liverpool and Glasgow, March 15th.

Three hundred barrels of flour shipped by a Racine firm were lost recently by the wreck of the schooner Restless, near Ludington, Mich.

The large 28 x 60 improved Corliss engine, built by Edw. P. Allis & Co., for the St. Louis Cotton Mills, has been started and is running finely.

H. H. Emminga succeeds in business the firm of H. R. Emminga & Son, dealers in buck-

wheat, graham flour and meal at Keokuk Junction, Ill.

E. Vandeventer's flour mill in East St. Louis, Ill., has burned.

W. S. Armstrong, head miller of the Lagrange flouring mills, at Red Wing, Minn., had his foot caught and crushed in some mill-gearing recently.

Mr. W. D. Gray, millwright for Edward P. Allis & Co., is on his way home from Europe, where he has been looking into the method of European milling.

Harvey Leonard, of Oberlin, Ohio, has contracted with Nordyke & Marmon Co., of Indianapolis, Ind., for a first-class four-run new process flouring mill.

Greeley, Col., with a population of 3,000 souls, requires no police or constable, has no liquor stores, and has spent only \$7 of its poor fund in two years.

Messrs. Edward P. Allis & Co. have nearly completed the experimental roller mill for Gov. Washburn, and the Hungarian miller has arrived to take charge of it.

Messrs. Edward P. Allis & Co. have lately put in several special grinding and polishing tools for finishing their porcelain rolls, which adds greatly to their efficiency.

Nordyke & Marmon Co., of Indianapolis, Ind., are remodeling the mill of Stubbs & Co. at Delevan, Ill., to the new process, and are now setting up the machinery.

The New Harmony (Ind.) Mill, now being built by Nordyke & Marmon Co., of Indianapolis, Ind., is having an additional run of buhrs, making it a four-run mill.

The damage caused by floods in Hungary during the early part of March are very extensive. Whole villages were swept away and many citizens deprived of homes.

Edward P. Allis & Co. have given notice through the milling papers that they are the owners of the Downton process patent, and will call to account all who purchase rolls elsewhere.

A two-run mill is being fitted up for I. J. Bolton, of Terre Haute, Ind. The mill and machinery are being manufactured at the works of the Nordyke & Marmon Co., at Indianapolis, Ind.

It is claimed that the idea of using magnets to take out wire and other particles of metals from wheat was first conceived and put into execution in the flour mill of Olds & Fishbeck, at Rochester, Minn.

G. K. Ziegler, of Bucyrus, Ohio, is putting in three additional run of buhrs, bolts, purifiers, elevators, and other machinery for his mill, purchased of the Nordyke & Marmon Co., of Indianapolis, Ind.

A Minneapolis man has invented a concave grinding mill, and upon the fact being mentioned, already nearly a dozen other inventors of similar mills speak up. A European journal illustrated one a few weeks ago.

The grain elevator at Bloomfield, Indiana, owned by F. M. Dugger & Co., was entirely destroyed by fire March 1st. It contained over 4,000 bushels of grain. Loss on building and grain, \$5,000; insured for \$2,000.

Louis Bode, of Shenandoah, Page county, Iowa, advertises for a wife. Wants either English or German, of sound health, and promises a suitable woman with a kind husband and good home. Show this to the girls.

Messrs. Edward P. Allis & Co. will soon be in receipt of a large shipment of French buhr blocks direct from the quarries in France, where they were selected by their Mr. Gray, and will be the finest lot ever brought to this country.

Shippers of grain inland, ocean carriers and dealers, of Montreal, are petitioning the Canadian Parliament to have no duty on American grain imported into the Dominion. They maintain that the export trade of the city, and its trade generally, would be seriously interfered with by the imposition of such duty.

Wm. Manypenny's extensive warehouse at Columbus, Ohio, was totally destroyed by fire March 1st, including its contents, consisting of 80,000 bushels of corn, 600 bushels of malt, 250 barrels of stearine, and considerable flour. The loss will be between \$80,000 and \$100,000. During the night five fires took place. Four men were arrested, supposed to have been connected with the gang who caused the fires.

The Minnesota Legislature has passed a bill regulating the grading and measurement of wheat. The new system is to be known as the "Minnesota standard gauge," and includes seven grades, from "No. 1 Extra" to "No. 4 Standard" and "Rejected Standard." Grain must be measured in the legal half bushel by methods prescribed. A refusal of agents or purchasers to grade or measure wheat as prescribed is made a misdemeanor and punishable by fine and imprisonment.

Mr. John F. Cahill, the Mexican Consul at St. Louis, has received a telegram from the City of Mexico, stating that the Minister of Public Works, Gen. Vicente Riva Palacios, has given orders for the erection of a building for the International Exposition which is to take place there in 1880. The work is progressing rapidly, and all materials for the construction of the building will be purchased in the United States. While this Exposition will be international in character, exhibits from this country are specially invited, and it is expected that the Americans will make numerous and fine displays of their various goods, wares, machinery, etc.

Subscribe for the United States Miller. \$1.



## UNITED STATES MILLER.

E. HARRISON CAWKER, EDITOR.

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MILWAUKEE, APRIL, 1879.

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M'LEAN'S Millers' Text Book and the UNITED STATES MILLER, for one year, for \$1.25. Order now. Send money or postage stamps.

LETTER postage to almost any country in Europe is only 5 cents. A newspaper can be sent to most any country in the world for two cents.

POSTAGE stamps taken in payment of subscription to the UNITED STATES MILLER and the Millers' Text Book. \$1.25 pays for both for one year.

WE are under obligations to the publishers for late copies of the illustrated *Adelaide News*, published by Messrs. Pearson & Bro., of Adelaide, Australia.

WE were favored during the early part of the month with a call from the editor of the *Deutsch-Amerikanische Mueller*, of Chicago. He reports business good.

THE pork packing interests of Milwaukee are very extensive. The packing from March 1st, 1878, to March 1st, 1879, was 540,374 hogs, making 117,874,247 pounds of pork and 19,475,644 pounds of lard.

We will send a copy of the MILLERS' TEXT BOOK, by J. M'LEAN, of Glasgow, Scotland, and the UNITED STATES MILLER, for one year, to any address in the United States or Canada, for \$1.25. Price of Text Book alone, 60 cents. Send cash or stamps.

LEWIS J. HIGBY, one of the early settlers of Milwaukee, died at his residence in New Orleans, whither he moved some years ago, on March 12th. He was the first President of the Milwaukee Chamber of Commerce, and built the first elevator in this city.

MESSRS. LORD BROS., of Waupaca, Wis., have sent us a sample of the "ready reckoning card" for millers' use. It is a very convenient thing for quickly and correctly ascertaining the amount of flour, middlings and bran for any quantity of wheat, taking one-eighth toll.

THE *Northwestern Miller* has moved from La Crosse, Wis., to Minneapolis, Minn. The move is a good one, and we only wonder that it has not occurred before. The *Northwestern* will now probably soon hang out the sign, "Official Organ of Minnesota Millers' Association."

THE Cockle Separator Manufacturing Company of Milwaukee inform us that during the past month they have made a very large number of shipments of their machines. Orders have been filled from almost all portions of the United States and quite a number from Great Britain.

WHY?—A correspondent of the *London Miller* asks, "Can any of your readers give me a good reason why in London a stone of bread

is 16 pounds and a stone of flour 14 pounds?" If they can, we would like to ask why it is that when our coal merchants buy coal that they get 2,240 pounds to the ton, and when they sell they give 2,000?

LOOK HERE.—Every mill-owner, miller, millwright and apprentice should have a copy of the Millers' Text Book, by J. M'Lean, of Glasgow, Scotland. Price 60 cents; or the UNITED STATES MILLER, for one year, and a copy of the Text Book for \$1.25. Postage stamps taken.

WE have lately received the first two numbers of the *Oesterreichisch-Ungarische Mueller*, published at Vienna, Austria, by Mr. Otto Maass. The paper starts out with liberal patronage and is well edited. We hope our trans-Atlantic contemporaries will all meet with success.

Advertisers will consult their own interests by patronizing the UNITED STATES MILLER, which circulates almost exclusively among the flour milling class. It has the largest circulation of any milling paper published in America, and was the first independent milling journal started in the United States not being connected in interest with any patented machine or milling supply house.

ON Monday, March 10th, the *St. Louis Post-Dispatch* came out from its new office more than doubled in size. The prosperity of this journal is something unprecedented in St. Louis journalism. The issue on the date above named was 30,000 copies. The new office is filled throughout with new types and presses, and the prospects of this brilliant paper are truly dazzling.

DURING the year 1878, 121,369 persons—75,347 of whom were aliens who had never been in the United States before—arrived in this country from foreign ports; 80,000 of these it is estimated went to Western States. It is also estimated that during the year 520,000 persons emigrated from the Eastern to Western States, most of whom have entered upon agricultural pursuits.

JONATHAN MILLS, ESQ., the well-known inventor, called on us a few days since and reports that he has at last perfected his gradual reduction system. The favored few who have been invited to see it say it discounts anything yet discovered in milling. We are not at liberty to publish any particulars yet, but will do so soon. Mr. Mills' business headquarters are in Chicago. He still resides in Milwaukee.

In a recent letter from Messrs. Gratiot Bros. of Platteville, Wis., they mention that business is opening out well this spring. They have lately sold Iglehard Bros., Evansville, Ind., 7 heaters; Nickeen Bros., Terre Haute, Ind., 5 heaters; Star and Crescent Mills, Chicago, Ill., 10 heaters; Bennett, Knickerbocker & Co., Jackson, Mich., 6 heaters; F. Schumacher, Akron, Ohio, 6 heaters; Commins & Allen, Akron, Ohio, 6 heaters.

JOHN A. HAFNER, the well-known manufacturer of the Eureka coil springs for mill spindles, locomotive counterbalance, threshing machines, street cars, etc., at 39 Water street, Pittsburgh, Pa., writes us that business opens out livelier this spring than ever before. The usefulness of his springs needs no commendation from us. They have already been introduced into and their merits are vouched for by thousands of flour mills in this country.

CARR'S PATENT DISINTEGRATING GRINDING MILL.—We respectfully call the attention of our readers to the advertisement of the above mill in our advertising columns, and would advise our enterprising millers to write to the advertiser for further particulars. It is intended by the owners to introduce this system into our country at an early date, and they would be pleased to hear from as many as feel an interest in the advancement of the milling art as possible.

WEED SEEDS IN BARLEY AND OATS.—Barley and oats as brought into market frequently contain a considerable amount of cockle, wild buckwheat, and numerous other seeds of similar shape, which if not removed are injurious to the barley for brewing purposes and to the oats for the manufacture of oatmeal. The Cockle Separator Mfg. Co. of Milwaukee now construct a machine for the especial purpose of removing these obnoxious seeds from oats and barley. It does the work almost perfectly.

Oat and barley meal manufacturers and maltsters should not fail to examine this machine and try its merits.

THE product of wheat in England and Wales in the year 1811 was 32,000,000 bushels. At that time about 20,000 sacks per week were consumed in London.

WE were favored with a pleasant call, March 22d, by Mr. H. E. Kratz, the representative of the well-known firm of M. Deal & Co., of Bucyrus, Ohio, manufacturers of the California smutter and separator. Quite a number of these machines have been put in in this city during the past winter, and they have been found especially adapted for use in the numerous wheat-mixing establishments which have sprung into existence by the score in Milwaukee lately. The condition of the last crop was unusually advantageous to the mixers.

THE DUMPLING TEST.—A correspondent says that "in regard to the best method of testing flour for strength and color, I beg to say that for the past thirty years I have adopted the old practical method of boiling dumplings for this purpose as follows: I am provided with a small pair of scales, and I weigh off three ounces (which is about two tablespoonfuls) of the flour I desire to test. I place it in a small basin, and add the necessary quantity of water to make it into a dough, which tie up in a cloth, and boil for about twenty minutes. The dumpling, on the removal of the cloth, if the flour is strong and good, should present a smooth appearance, and the creases produced by the cloth should be clear and well-defined; if, on the contrary, the dough hangs to the cloth, and the creases are flat and ill-defined, the flour is weak, and its baking properties bad. On cutting the dumpling, if the color is good it will not darken on cooling; but flour of bad color, on the contrary, becomes darker as it cools. I use a graduated glass to measure the water. The quantity of water used to make the dough of the usual consistency varies considerably, and is also a guide to the strength of the flour, as the stronger the flour the more water it will take."

## GERMAN MILLERS' ASSOCIATION.

The German Millers' Association was first established January 31st, 1865, with 51 members, at a meeting held in Dresden. Josef J. Van Den Wyngaert was the first President. The Association now numbers over 3,000 members, and is in as flourishing a condition as could be desired. The discussions at their various meetings are lengthy and instructive. One of the practical benefits arising from association is the great reduction in the cost of insurance which theretofore was so great as to be almost prohibitive. Questions of duties on flour and grain, transportation, trade schools, machinery and methods of milling have been considered to great advantage. The annual meeting is now the occasion of a general exhibition of milling machinery, to which inventors and dealers from all parts of the world are invited to contribute. President Van Den Wyngaert takes the deepest interest in advancing the scope of usefulness of the Association.

## BRITISH MILLERS' BOTHER.

It seems to be the delight of European legislators to enact laws of peculiar burden in many instances to manufacturers. The recent Factory and Workshop Act of 1878 has just now put the British millers—who have had trouble enough during the past few years to withstand the encroachment of foreign opposition—to their wits end, and at a recent meeting of the British and Irish Millers' Association this act was construed to them by Mr. Redgrave, C. B., Chief Inspector of the Factory Department. Flour mills are classed as factories and come within the provisions of the act. The entire inside of mills must be whitewashed at least once in 14 months, or else painted and varnished once in seven years; perfect ventilation and freedom from dust must be provided for; all shafting and machinery that may be considered in the least dangerous must be fenced in; and then follow various arbitrary provisions about the number of and between what hours boys between 16 and 18 years old and men can be allowed to work. The matter was discussed at considerable length, and the millers finally concluded that, as they must, they would try to bear all the provisions except the whitewashing, and on that subject they proposed to use the Britishers' great and glorious prerogative—to get up a petition. But the whitewashing in the meantime will have to be done just the same.

## MINNEAPOLIS FLOUR PRODUCT.

The branch of manufacturing which represents the largest amount of capital invested and value in product, is flour. The product in 1878 was materially diminished by the destruction of six of the mills on the 2d of May, by fire and in November of another by the same cause. By these two fires one-half the milling capacity of the city was destroyed. This loss of milling capacity, however, was only temporary, as most of the mills destroyed have been rebuilt and three new mills put in operation, giving a capacity far greater than before the fire. Two new mills are now in course of construction which, with the three that are being rebuilt, will about double the milling capacity of the city. All of these will be completed during the present year. The addition of a large number of rollers increases the capacity of the mills thirty-three per cent.

List of mills now in operation, with number of run of stone in each, including additions being made:

Name.	No. run.
Cataract .....	10
Arctic .....	10
Union .....	6
Holly .....	5
R. P. Russell .....	7
Dakota .....	6
Empire .....	12
Minneapolis .....	11
Pillsbury .....	12
Excelsior .....	14
City .....	5
Pettit & Robinson .....	20
Zenith .....	12
Palisade .....	11
Humboldt .....	14
Washburn B. ....	41
Anchor .....	12
North Star .....	7
Phoenix .....	5
Total .....	220

## SHIPMENTS OF FLOUR IN 1878.

	Barrels.
January .....	84,139
February .....	80,114
March .....	95,804
April .....	112,632
May (mills destroyed) .....	64,654
June .....	63,973
July .....	65,239
August .....	41,250
September .....	62,258
October .....	87,900
November .....	88,189
December .....	94,634
Total .....	940,786

One feature of the flour trade of the city in 1878, is the opening of a direct trade with Europe. By shipments on through bills of lading, from thirty cents to one dollar per barrel is saved in commissions and transfer charges at sea-board ports. Of the shipments, 109,183 barrels were shipped on through bills of lading to European ports in 1878.

The demand in Europe for Minnesota flour is steadily on the increase, as its superior qualities become known to consumers, and it bids fair to be the best market to which Minnesota millers can send their flour. Orders of shipments are received daily by millers.

The receipts of wheat at Minneapolis for the year 1878, were 5,023,880 bushels. This wheat was almost exclusively manufactured into flour in this city.—*Minneapolis Tribune*.

WINDMILLS were invented in the year 1299. In the year 1633 a wind sawmill was erected in the Strand, London, by a Dutchman.

THE first newspaper published in England was called the *English Mercury*, July 28, 1588. A copy of it is on file in the British Museum.

MILLERS' BURR RUBBER.—Messrs. Miller & McCarthy, of Mt. Union, Pa., are meeting with great success in selling their burr rubbers, and they give general satisfaction wherever used. Among the numerous testimonials they have on file is the following:

JUNIATA MILLS, PA.; June 17, 1878.—Messrs. Miller & McCarthy—GENTLEMEN: Having used a pair of your burr rubbers for more than two years I take pleasure in recommending them to the milling fraternity. They will do all that they are recommended to do, and I would not be without them. When I take my burrs up I wash them off when warm, and when dry staff them; and if any high spots are on them I crack them a little and take the face rubber and rub my burr all over—the high spots the most. If there be no high spots and I want to make them sharper, I do not use the pick, but rub the face all over with the rubber, and that gives me the natural grit of the burr, and then a burr will grind even, white and soft, and clean the bran well. I can keep my burrs in good face with half the labor by using your rubbers, and the flour is better and the yield greater. I think all a miller has to do is to try them and he will soon see the benefit of using the rubbers. They should be in every mill, both the face and furrow rubber. Very respectfully,  
H. M. BUTLER.



## GRAIN.

## Peculiarities in its Normal and Manufactured State.

*An Investigation Under the Microscope—Showing the Adulterations and Natural Evils to which It has been Subjected.*

A COMPLETE INVESTIGATION OF THE SUBJECT BY ONE OF THE LEADING CHEMISTS OF EUROPE.

Flour in General—Wheat Flour—Rye Flour—Barley Meal—Oat Meal—Indian Corn—Rice Meal.

[Translated from the German of Dr. Herman Klenke expressly for the UNITED STATES MILLER,—cuts reproduced by our special engraver from the original.]

## WHEAT FLOUR.

This is the ground seed of the *Triticum vulgare*, the two kinds of which are distinguished as summer and winter wheat. The universal belief is that it is best when it appears very white, that is to say, when it has been thoroughly bolted and free from all admixture of bran. Since this white flour brings the highest price in commerce, we also, from the point of view of the customary commercial opinion, must describe the fine white flour which contains no bran, and is consequently not so white, since it is not alone much more nutritious than the bolted flour, but has also when baked into bread the important quality of assisting the dissolubility of the flour or bread in the stomach, and thus makes it much more digestible. In commerce, according to the quality, several grades are distinguished, and the price is determined accordingly. The best quality is of a white color, lightly tinged with yellow, has a very peculiar odor, a bright gloss, and is without reddish, gray or blackish points. The taste may be compared with that of fresh paste. According to the usual demand it must be free from all particles of bran, and if it is so, the fact may easily be proved by pressing a finger on it, since in flour containing no bran it will then present a perfectly uniform smooth surface. The best wheat-flour will be found soft, dry and heavy to the touch, will adhere to the fingers, and by pressing it in the hand it will form a lump. When kneaded with water, whereof it must absorb more than a third of its weight, it must form a uniform, ductile elastic mass which will not be very sticky and may be drawn into thin strings. The less ductile and elastic the dough is, the poorer is the quality. All inferior qualities have a dull-white color since they contain bran, and if such flour is pressed firmly in the hands, it forms no lump, but will slip away, unless it is moist. Good wheat flour burned to ashes, will yield from 80 to 90 per cent residuum.

A chemical analysis has disclosed that good wheat flour contains:

Water parts.....	10.00 to 12.00
Gluten .....	10.96 to 14.55
Albumen.....	29.00 to 30.20
Starch .....	71.49 to 72.80
Glucose.....	4.48 to 8.48
Dextrine.....	3.32 to 5.80
Bran.....	0.00 to 2.00

Though good wheat flour may always in its principal nutritious components attain and even surpass the amount of 10 per cent gluten and 70 per cent starch, such amount depends very much upon the soil on which the wheat has been raised, on the mode of grinding, etc., and it has been ascertained that in general the Russian wheat shipped from Odessa, though richer in its glutinous contents is remarkably poor in its percentage of starch, which generally amounts only to 56 to 57 per cent. All wheat flour (as all grain flour generally) is richer in glutinous contents the more of the bran particles it still contains. That bran contains very many nutritious substances might become clear by its chemical analysis, which (according to Milon), shows it to be composed of:

Starch, dextrine and sugar .....	50.
"Reglisse" sugar .....	1.
Gluten (and albumen).....	14.9
Fatty matter .....	3.6
Cellular substances.....	7.9
Salts .....	5.7
Water .....	13.9
Other substances .....	1.2

Total.....100.0

Another difference in the quality of wheat flour results from the different degrees of hardness of the wheat. The buyers of wheat prefer the heavy, plump wheat, for which reason the farmers separate the light kernels from their wheat and either use it for themselves or feed their cattle with it. When the time has come that, in practice, gluten is more highly estimated, than it is at present, and when the nutritious and digestion promoting quality of

bran shall be acknowledged, the so-called lighter wheat will also be more highly valued, since this is much richer in gluten and consequently much more nutritious than the heavy wheat. The flour of hard wheat is usually more granulous, and less fine and white, absorbs more water and yields more bread. To distinguish wheat flour from

other kinds of flour with which it is but too frequently mixed, the microscope furnishes a reliable method, since the starch particles of wheat show definite characteristics. As is well known, all starch consists of distinctly marked particles of different build and characteristically shaped according to the kind of plant, which particles are enclosed in the starch cells and are liberated by the grinding and washing. In Fig. 11 we give a picture of the wheat flour magnified 420 times, where in the shape of the starch particles and also those starch cells which have not yet been opened by the grinding are represented. Some of these starch particles are of considerable size, others again are smaller, generally round, sometimes oval with a dot or circle in the center; the larger specimens mostly form large, flat discs with a narrow rim and more or less concentric rings around the center. On the larger particles the surface also sometimes appears furrowed, especially on the more or less deformed or oval specimens, which look wrinkled or plaited, as though their center contents were compressed; but they are seen in profile and the long furrow seems to be only the rim, which refracts light less, for when the two glass-plates of the object-bearer are rolled, so that the oval bodies are flattened and turn the plane of the disc to the eye, the furrow disappears. All poorly ground and gray looking flour as before said contains more or less

husk (bran); to discern this and judge at the same time whether this husk comes from the seed, the name of which the flour bears, it is necessary to be familiar with the microscopic nature of the husk also. In Fig. 12 a and b we give a picture of the structure of the husk of the grain of wheat in its length and cross incision. But to be

enabled also to point out the starch particles of wheat flour when baked and cooked, it is necessary to know the changes caused by the influence of heat in the shape of the starch particles of wheat. For the purpose of comparison we give in Fig. 13 a picture of the starch particles in raw wheat flour, its appearance in bread after being baked with yeast, after dry baking, and lastly after being cooked,

as for instance in pudding or meal soup, all magnified 400 times. Wheat flour without being purposely adulterated and without containing the aforementioned fungi, seeds of weeds and animal parasites, may still be of inferior quality when offered in trade. When good it always contains a proportion of water, which it absorbs from the air, either after grinding

or already in the grain, and the water it contains has an evident influence upon the weight of the flour. The smallest quantity is usually 6, the largest from 20 to 25 per cent, and good flour will always contain about 10 to 12 per cent. The percentage of water it contains may be found by drying an accurately weighed quantity of wheat flour in a moderately warm sand-bath for two hours, and then again weighing it; what it has lost in quantity is the water which has evaporated. If the flour cannot be pressed much in the hand, or if it does not feel 'cold' when the hand is put into it, a further examination of its contents of moisture is not necessary, for it will then only con-

tain the normal proportion of 12—15 per cent. Dried wheat flour put in some moist place will soon begin to ferment and thereby become lumpy, which often increases the weight more than 14 to 15 per cent. All moisture has an injurious effect upon flour, changes the gluten, and renders it unfit to produce good dough; besides this it promotes the formation of sporules of fungi and their further development, and in this way poisonous bread may be made. Often flour which is otherwise good, is mixed with the sand of mill-stones, especially when the mill-stone was soft or the grain moist. In good mills grain ought never to have an admixture of more than 15 g. of sand from the stones to 50 k. g. (about 1 cwt.) of grain. Such sandy flour is known by grating on the teeth, and to determine the quantity of sand in the flour, a certain amount of flour is boiled, the water is poured off, and the sand will be found on the bottom of the vessel. The best flour has often been damaged by the exposure of the meal sacks to the sun during transportation, thereby heating the flour. An alteration of the gluten, something similar to when heated in the mill is occasioned by this. The same will sometimes occur with new grain when ground. By being stored for some time it will improve, as the gluten is thereby again rendered adhesive, and will not form lumps when the flour is prepared for use. The glutinous contents of wheat flour is very different both in quality and quantity in the various kinds. The former may become poorer by too rapid grinding of the corn, since the mill-stones, rotating too fast, will become heated and change the gluten. Such flour is said to be heated. The contents of water in the gluten also has to be considered, by weighing it when moist and when dry; the less water it contains, the more bread will it yield,—100 parts of gluten of ordinary flour contains 12 to 14 per cent of water and produce 133 to 136 parts of bread on an average. But if 100 parts of gluten contain 18 per cent of water, they will only produce 120 parts of bread. To examine the quality of the glutinous contents, dealers in flour and bakers usually apply a very simple method; with their fingers they make a dough of a very small quantity of wheat flour and a little water and judge of the quantity and quality of the gluten by its elasticity, toughness and ductility. If it is necessary to examine this with scientific exactness we recommend an instrument called the aleurometer (meal measure), which the Paris baker, M. Boland, has invented. This consists of a hollow copper cylinder, about 15½ dm. long, and from 2 to 2½ cm. in diameter. It is composed of two main parts; the one, about 5 cm. long, is closed at the end with a sort of lid or cover, and is capable of holding about 15 g. of fresh gluten; it is screwed to the remainder of the cylinder. A copper rod or stem about 5 cm. long and divided into 25 parts, is provided at one end with a small, round, slightly arched plate, reaches down to a third of the cylinder and may escape through the upper part of the cylinder opposite to the cover, and in such a manner, that when the lid is filled, there is a vacuum between the gluten and the base of the movable stem, the height of which is about 25 deg. of the stem. The whole of the small apparatus, when in practical use, is then placed in an oil-bath, that is, in a vessel filled with oil, heated from 150 to 250 deg. entigrade. At this high temperature the gluten swells, increases in volume, rises in the cylinder, and soon reaches the graduated stem which it forces more or less upwards. The length of the swelled gluten, or rather the height to which the graduated stem has been raised, which here serves like a pump-piston, indicates the development of the gluten, its quantity and quality, and thereby allows to judge of the qualities of the flour out of which it was taken. Good wheat flour ought to contain gluten which will increase from 4 to 5 times in this apparatus, if the gluten which has been examined in this apparatus has been obtained from poor flour it will not swell in the cylinder, will become slimy and almost liquid, adhere to the walls of the cylinder and sometimes become of a disagreeable odor. Good gluten will cause a smell as of hot bread. If the gluten does not reach the stem during this process, that is if it does not expand to 25 deg., the flour out of which it has been taken is unfit to make good bread. The 25 deg. are numerated in such a way that they begin with No. 25 and end with No. 50. Once in possession of the instrument the test is easily applied, and the use of the apparatus will be better understood by practice than by our description. For the experiment about 5 to 8 g. of gluten are taken which by being dried and thereby free from water would be reduced to about 3 to 4 g. In what manner the gluten is separated from the flour so that this experiment may be applied to it, has been stated before. In good flour the gluten usually will expand to by far more than 25 deg., in most cases to 33, 35, 39, and even 50 deg.

[To be continued.]



Fig. 11—Good wheat flour starch particles and starch cells, magnified 420 times.

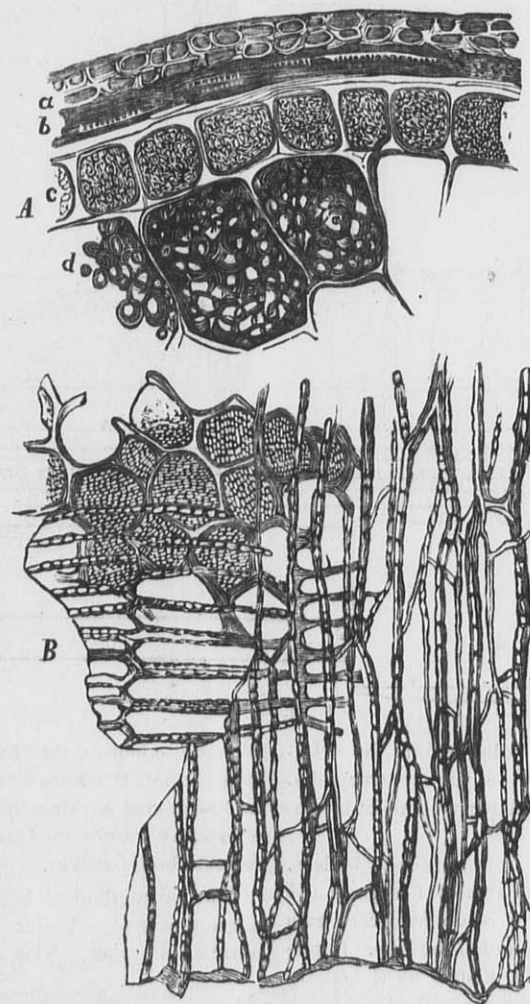


FIG. 12—STRUCTURE OF THE HUSK OF A GRAIN OF WHEAT. a—Cross incision. b—Outer membrane. c—Middle membrane. d—Inner membrane. e—Starch-cells of the wheat berry proper. f—Cut lengthwise of wheat berry. Magnified 200 times.

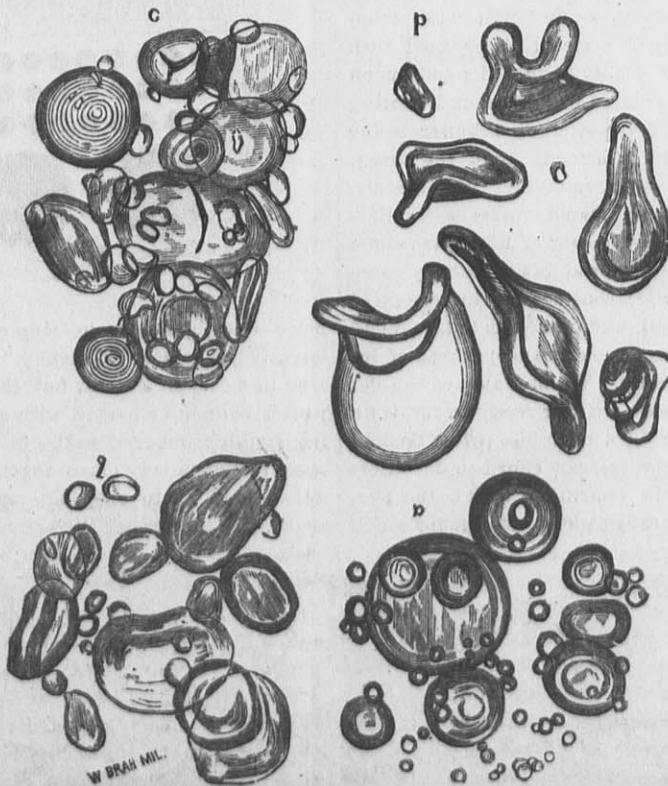


FIG. 13—VARIOUS FORMS ASSUMED BY THE STARCH PARTICLES OF FLOUR AFTER SUBJECTION TO HEAT. a—Starch particles in uncooked or raw wheat flour. b—The same in bread baked with yeast. c—After dry baking. d—After being cooked in porridge or pudding. Magnified 400 times.



## ABOUT STEAM BOILERS.

The frequent boiler explosions in the land from year to year have called for some intelligent investigation into their cause. Were they the result of poor material, poor workmanship, careless management, or, all three together? These are questions of great importance, not only to the manufacturer, but to the people in his employ. The use of steam power has increased vastly within the past ten or fifteen years. Boilers of various types and materials have been devised. Some inventors have devoted their time to the production of a "non-explosive" boiler, while others have turned their attention to the question of economy in fuel. The combination of different materials in construction, varying greatly in the matter of expansion and contraction under different degrees of heat, have rendered many of these efforts entirely fruitless. It has been a favorite idea with some, that if instead of confining the water and steam in a large reservoir or cylinder they can be circulated through small pipes, the great danger of destructive explosions would be avoided. It is found, however, that the character of the water has much to do with the usefulness of such boilers. In localities where the water deposits a heavy scale, small passages are very liable to get filled up, notwithstanding the claim that rapid circulation prevents the accumulation of such deposits. That some of these types of boilers work well in localities where the water is comparatively pure, there is no doubt; but their success has not been so marked as to satisfactorily settle the question of their adaptability to general use. In mills, tanneries, and establishments remote from great centers, difficulty is often experienced in making repairs easily and readily on sectional boilers, especially if they are partly or wholly constructed of cast-iron. Special castings must be obtained, and special workmen must be sent, often from great distances. These are some of the difficulties which we have noticed. They are not mentioned to disparage the efforts of those who have labored to produce a "non-explosive" boiler, nor to interfere with any honest industry, but to point out some of the difficulties which must be overcome before complete success can be attained.

Another matter, which should be better understood by those purchasing boilers, is "competitive tests." At mechanics' and industrial fairs are usually found all kinds of steam boilers, each claiming points of superiority in economy and efficiency over others. The greatest care is exercised in running the boilers during the trials; expert firemen are employed; the water and coal are carefully weighed; the inflow of air into the furnace is measured with great accuracy; all escapes of steam by even the slightest leaks are stopped; the temperature of the uptake is regulated with the greatest care, so that the least possible heat shall be wasted and yet be kept high enough to be considerably in excess of the temperature due to the pressure of steam.

The result to be gained is, the evaporation of the greatest quantity of water by a certain number of pounds of coal, within a certain time, and this is called the evaporative efficiency of the boiler. But in making these tests particular attention should be given to the dryness or humidity of the steam.

The heating surface of boilers is often so arranged as to supply over-saturated steam, which is mistaken for evaporative efficiency. It is found that over-saturated steam, when supplied to an engine, does not give the power due to the consumption of fuel, and hence the rate of evaporation must not be regarded as a reliable indication of the steaming capacity of the boiler.

The man purchasing a boiler should understand that there is little or no probability of his ever attaining, in daily use, such results as have been obtained under the tests. He must remember that these results have been secured under the most advantageous circumstances, and if he purchases a boiler and it does not meet his expectations, he will understand from the foregoing why. There have been serious mistakes made by inducing steam-users to purchase boilers which in type and construction were not adapted to their wants. Some manufacturers have but an imperfect knowledge of steam and steam machinery. Being in want of a new boiler and the necessary attachments, they apply to some competent person for plans and specifications. These are furnished after a careful consideration of his particular wants. They are taken to a boiler-maker, and he begins to suggest changes, and he is allowed to change here and there as he chooses. Soon an agent for a new kind of grate-bar ap-

pears; he tells how much Mr. A. or B. thinks of it, and "whips" out a recommendation that sets it high above everything else.

No sooner is this done than an agent for some other attachment appears and convinces the manufacturer that the use of it will save him ten per cent. of his fuel, and so the work goes on until finally the boiler is set up and ready for use. The person who prepared the original plans and specifications calls in to see how nearly his plans are carried out, and finds something different from anything he ever saw

he will pay dearly in the end.

This will be better understood by the following: It is common among boiler-makers to estimate the horse-power of boilers by allowing a certain number of square feet of heating surface for one horse-power. Some claim as low as ten square feet as sufficient, while others place it as high as eighteen square feet. We will assume fifteen to be a fair average. Now we have a boiler five feet in diameter, fifteen feet long, with sixty-six three-inch tubes. What is the approximate horse-power?

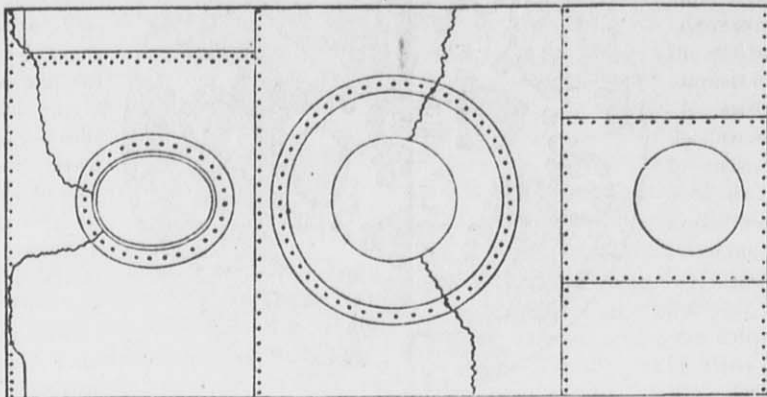


Fig. 1.

or dreamed of. He expresses some surprise, but the manufacturer assures him that every one of those changes and attachments will save fuel. When the various guarantees are figured up it is found that some fifty per cent of the fuel is to be saved. The boiler is started up, and found, with all its well-recommended changes and attachments, to possess no ad-

If we allow ten square feet of heating surface, it will be nearly ninety-horse power. If we allow fifteen square feet, it will be about sixty-horse power. Hence we see that the same boiler will be differently rated by different makers, and the manufacturer who purchases on the former estimate being ignorant of the rules by which horse-power is estimated,

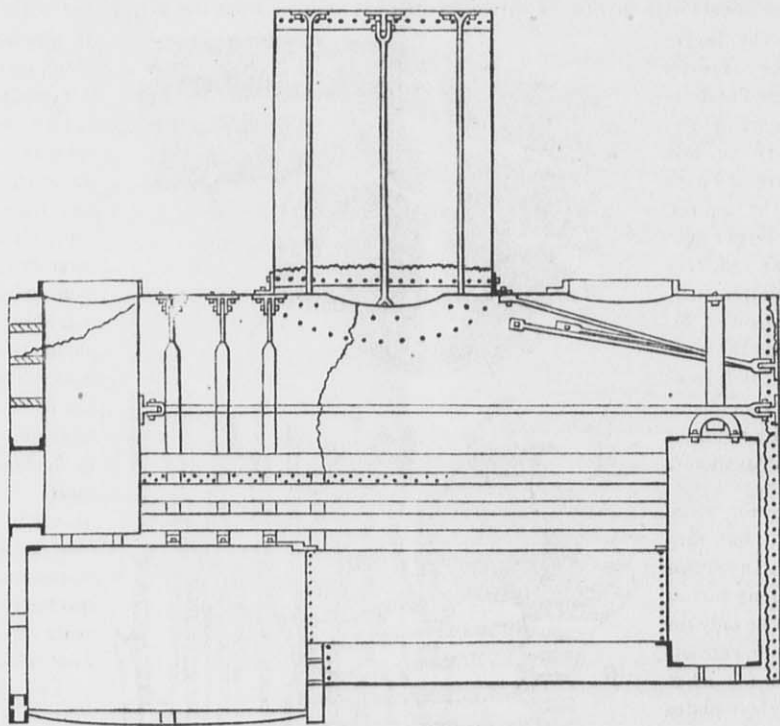


Fig. 2.

vantages over the one called for in the original specifications, but, on the contrary, discloses disadvantages which give constant vexation and trouble.

Another point is the horse-power of boilers. This depends upon the area of fire-grate and heating surface. There is no arbitrary rule which will apply to any and all boilers. Hence manufacturers are often misled by the statement that a boiler of a certain size is of a certain horse-power.

The average horse-power may be approximately jumped at. But when we come to investigate the subject we find that "the evaporating capacity of a steam-boiler fired with a given kind or quality of fuel depends upon the extent of area of fire-grate and heating surface." The real power of a boiler is the evaporation, which depends upon the firing, circulation of water, and other variable circumstances. One manufacturer of boilers may place the horse-power of his at a medium rate, while another for a less price may agree to furnish a boiler considerably in excess of power, but which, when constructed, is found to be of even less capacity and perhaps of inferior workmanship. We are always suspicious of those who are ever ready to furnish a great deal more for a much less price, than an honorable competitor can afford to do. Rest assured there is something which the purchaser does not fully understand, but for which

is made to believe that he has obtained a very large boiler, at a very low rate, when in fact he has gained nothing over the boiler that was offered by a more modest and probably more reliable boiler-maker.

Another method of increasing the apparent horse-power of a boiler is, by increasing the number of tubes. The argument is: "The

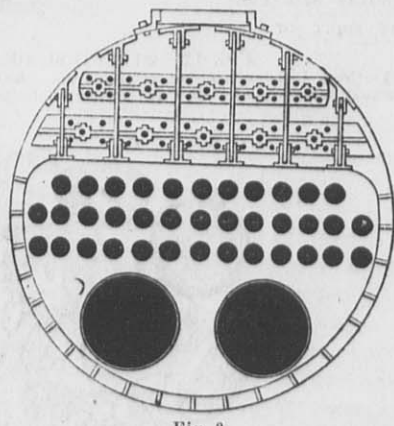


Fig. 3.

more tubes, the more heating surface, consequently the greater efficiency." This may be true to a certain extent, but there is a limit which cannot be passed with economy. If a reasonable number of tubes is exceeded they must be put in very close together, or carried up so high as to encroach upon the steam space. In the former case circulation is inter-

fered with, and if the water is bad, the spaces between the tubes and between the tubes and shell become filled with sediment and scale, and the efficiency of the boiler is greatly impaired; besides, the tubes, being unprotected by water, soon burn out. In the latter case the steam-room being reduced, the steam is liable to be highly saturated, and, as has already been said, "over-saturated steam when supplied to an engine does not give the power due to the consumption of fuel."

Experience has shown that comparatively large tubes, with ample spaces between, is the best method of constructing steam boilers.

In the care and management of steam-boilers, one cannot be too careful. It is poor economy to buy "cheap" boilers, or to employ "cheap" help to have the care of them. The lives of operatives and others are too valuable to be put in such jeopardy. True economy is commendable, but that economy which saves a dollar at the risk of losing hundreds, is false, as experience has often shown.

During the year ending Dec. 31st, 1877, The Hartford Steam Boiler Inspection and Insurance Company, of Hartford, Ct., to whom we are under obligations for the accompanying illustrations, made 11,629 internal inspections of steam-boilers, and 32,975 external examinations; 2,367 new boilers were tested by hydraulic pressure. By these examinations, 15,964 defects were discovered, of which 3,690 were regarded as of a serious character, and required immediate attention. The Secretary of the company says: "We are not prepared to say that every one would have resulted in a 'boiler explosion,' but they were of such a character that we required repairs at once. They were as follows, viz.: Furnaces out of shape, 709—85 dangerous. These defects arose from a variety of causes. Boilers urged beyond their capacity are very liable to show this defect. The plates are contorted and 'buckled,' the seams are strained, and general weakness becomes evident. There is no economy in overworking a boiler; better by far increase the boiler capacity, and then the work will be performed with ease and safety. Scale and sediment upon the fire-sheets of a boiler prevent the free transmission of heat, and the iron is burned and weakened. Fractures of plates in, at, or near the seams or through the line of rivets, 1,190—of which 517 were regarded as dangerous. Burned plates, 1,112—337 dangerous. These defects are caused by the same circumstances as those which cause the distortion of furnace sheets. Blistered plates, 2,602—357 dangerous. These defects are the result of a want of homogeneity in the plates. From the presence of scoria or some foreign substance, the bars composing the 'pile' did not weld perfectly, hence there are thin 'leaves,' one or more, which make an imperfect sheet. These are usually near the surface, and when subjected to heat bulge down, and by preventing a free transmission of the heat to the water within the boiler, the plate is liable to be burned. If the lamina (for there are often several lying one over the other) constitute any considerable portion of the plate, it is weakened and should receive immediate attention. Where the blister is confined entirely to the surface, if not of any great thickness it may be carefully trimmed off and no harm will result. Cases of sediment and deposit, 2,005—440 dangerous. Incrustation and scale, 2,621—341 dangerous. These are difficulties which are common to boilers all over the country. Water contains more or less impurity in solution which becomes precipitated by an elevation of temperature, and if great care is not exercised a hard indurate scale is formed, which is always a bad conductor of heat. The plates become over-heated, often to such an extent as to destroy their 'life' and strength, and render them positively dangerous. Various 'compounds' and 'boiler purgers' have been prepared to overcome these evils, and many of them work well in some localities. These difficulties arise mainly from the geological formation through which the water percolates, and as the formation is not uniform all over the country, the water will of course carry different impurities in different localities. Hence a preparation that would remove or prevent a lime scale, would have very little effect upon a scale formed from chalybeate waters. Above all things a preparation in which acid predominates should be avoided. External corrosion, 1,063—366 dangerous. Boilers are externally corroded from not being properly protected from the weather; also from leaky joints in steam-pipes running over them, and from leaks in their seams or attachments by which water is allowed to trickle over their surface. In

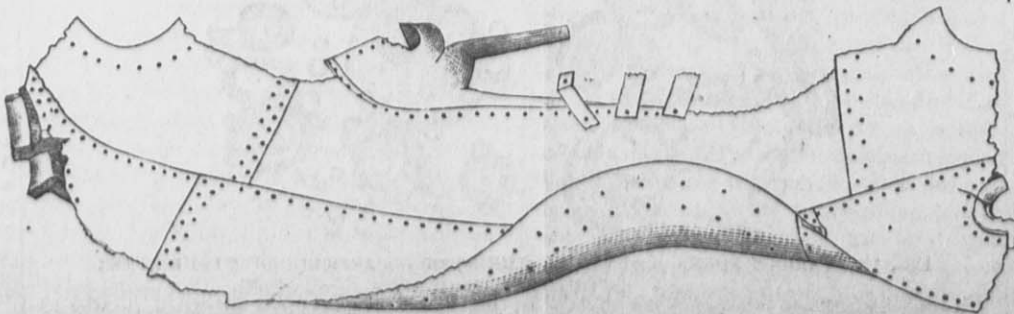


Fig. 4.



ternal corrosion, 173—39 dangerous. Water-gauges defective, 533—143 dangerous. Blow-out defective, 256—96 dangerous. Safety-valves overloaded, 383—158 dangerous. There is probably no boiler attachment more tampered with than the safety-valve. It is overloaded, tied down, or, from want of attention, allowed to corrode in its seat, and yet it is called a "Safety-valve." It is an attachment that should have the most careful attention at all times. Pressure-gauges defective, 1,623—403 dangerous.

Most engineers place great reliance on the steam-gauge, and so long as the pressure does not exceed the required limit they think all is safe. But when an examination of the gauge is made, and it is found not to show the actual pressure of steam, but instead some thirty or forty pounds less, and that the boilers are under one hundred and ten or one hundred and twenty pounds pressure instead of eighty pounds, it becomes a serious matter. This is no imaginary condition of things, but one which frequently comes up in our experience. Hence the importance of examining steam-gauges and comparing them with one known to be correct. We have found 615 boilers without gauges during the year, but as most of them were running at pressures very little above the atmosphere, we account only six as immediately dangerous. Cases of deficiency of water, 101—43 dangerous. Broken braces and stays, 378—216 dangerous. These defects were found by internal examinations. No superficial inspection or hydrostatic test simply will discover such defects. And from want of a careful internal inspection, boilers greatly weakened by internal corrosion or broken braces and stays are pronounced sound, and in good and safe condition. When an explosion occurs, scattering death and destruction in its vicinity, the discovery of such defects is not calculated to appease the public indignation. During the year 133 boilers were condemned as unsafe to use and beyond repair.

The defects enumerated above can only be discovered by the most careful examination. It should be done by men of experience and good judgment. The cursory examination of boilers which is often made lulls the proprietor into a feeling of security which may be fatal. The examination may have cost him less money, but he knows very little about the actual condition of the boiler.

#### BOILER EXPLOSIONS.

Most of these we believe can be traced to poor material and workmanship, or to very inefficient care and management and carelessness. There are steam users who, rather than stop for examination and repairs, will take the chances of running a "little longer," hoping that good luck will carry them through, a responsibility being thus assumed which, if better understood by the community, would be frowned upon.

The following is an account of the explosion of the boiler of a tug-boat, by which two persons were killed. Portions of the boiler were thrown 250 feet; timbers eight inches square were wrenched into shreds. It was stated at the inquest that only 75 pounds of steam was on the boiler at the time of the explosion. Of this, however, there is no certainty. The following is the report of a special agent who visited the scene on the day of the explosion:

This tug, which exploded in June, had to all appearances a very strong boiler—so much so that the Government inspector said if he had been called on to name the best boiler in his district, he would have selected this one. At the inquest the engineer was very sharply questioned as to his tampering with the locked safety valve, and about a lead weight that was found on the lever. It came out that the boat was much used in winter for breaking ice in the river, and the shock of butting against it would shift the weight toward the fulcrum in spite of such fastenings as had been used, so to keep up the load on the valve he had added another weight, claiming that it would "blow" at the prescribed pressure.

A short time before the accident the boiler had admirably sustained the usual hydrostatic test as the law directs. The question was then asked, whether the man-hole frame was cast or wrought iron? But the engineer could not say. Whether it was then cracked and leaking we do not know, but such a state of things would most naturally prompt such a question, inasmuch as the plate was a large one, while the frame was rather small in cross-section, and placed the long way parallel with the axis of the boiler.

Figure 1 is a view of the top of the boiler, showing the man-hole, steam dome and smoke opening. From a careful examination the

conclusion arrived at was, that the boiler, notwithstanding its assumed strength, was very weak from faulty construction. It contained within itself in the form of braces and stays the elements that caused its own destruction. The shell was cut away for the man-hole and dome 40 inches in 78, and reinforced by a light cast-iron frame and by 8 stays or braces from the dome-cover to a yielding portion of the shell, that portion within the dome being in equilibrium of pressure. In addition to these

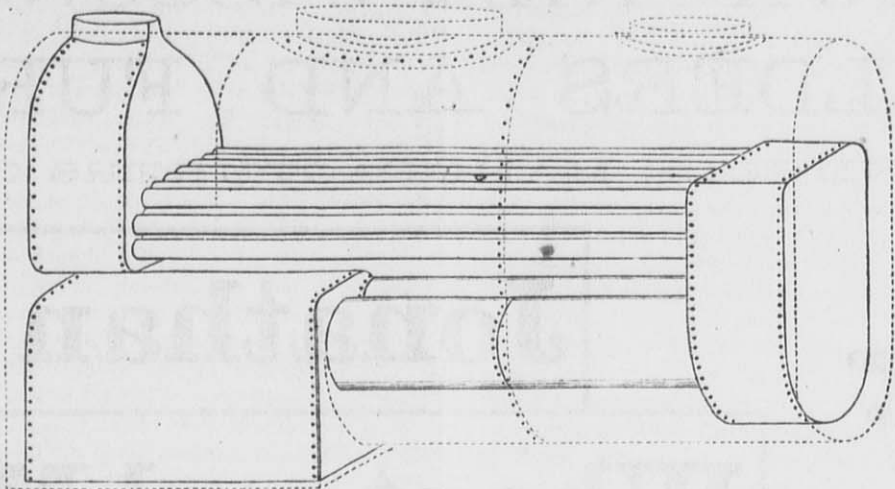


Fig. 5.

supports six braces were connected to the shell and the back smoke-box.

Figure 2 is a longitudinal section of the boiler, showing the bracing of the dome to the unsupported portions of the shell. Other bracing is also shown, and the line of fracture on the left side. These braces, which are  $\frac{1}{2} \times 4\frac{1}{2}$  inches in section, are nicely fitted, having round bolts fitting snugly into round holes in the arched double stirrups which stand upon an unyielding part of the crown of the smoke-

Two years' action proved quite sufficient to bring it to destruction; a considerable length of weakened plate gave way like opening a door, and the contents of the boiler, water surcharged with steam, and steam expanded in so sudden a manner as to tear all before it.

There was extensive internal corrosion at the point where the barrel joins the box, and in other places on the lower parts of the shell. We can hardly escape the conviction that the lower part of the shell, where the water is

cooler from defective circulation, was kept in an unhealthy state of tension by the thrust of the hotter and very rigid flues above. With sketch No. 4 before us, we could not, however, decide that the initial point of rupture was in the lower part of the boiler, or otherwise the boiler would have gone high in the air, as the dome and smoke-stack did. There was very little scale, incrustation, or deposit, and no burned plates or other evidence of lack of water.

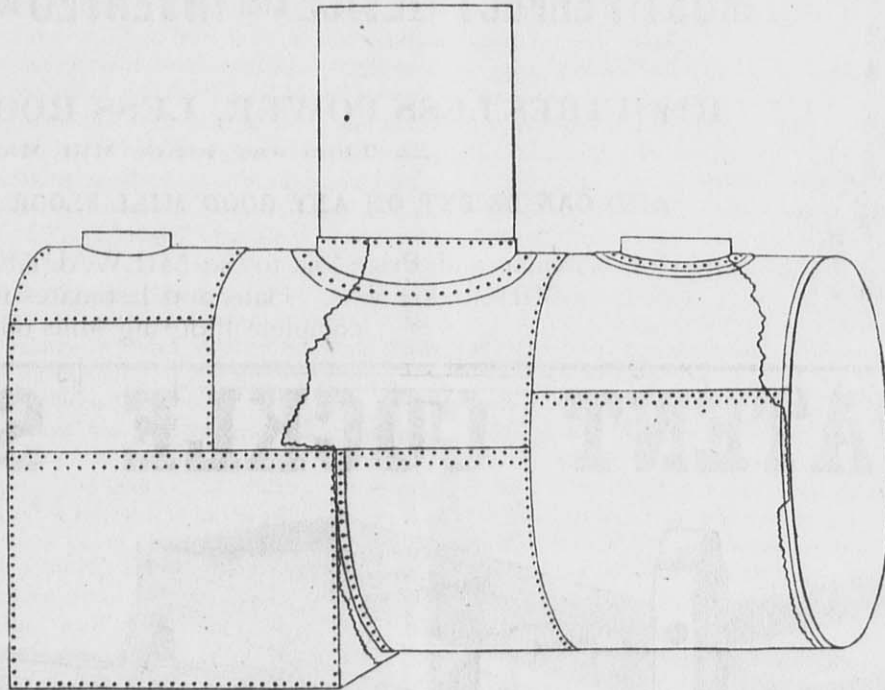


Fig. 6.

box; the other ends of the braces being similarly fitted to double-angle plates on the shell. Now glancing at Fig. 3, imagine this smoke-box to be an expanding body relatively to the shell; that is, imagine it to be a little hotter than the shell (and why may it not be considerably so, filled at times with intensely heated gases, and surrounded by water at 331 deg., which is the temperature at which it boils under 90 lbs. pressure above the atmosphere, while the shell, unprotected as it was from the

Fig. 4 represents the principal part of the shell which was torn off and thrown some distance into the water.

Fig. 5 is a perspective view of the interior of the boiler.

Fig. 6 is a perspective view of the exterior of the boiler, showing cracks around manhole and dome.

Fig. 7 shows what remained of the boiler after the explosion.

[To be continued.]

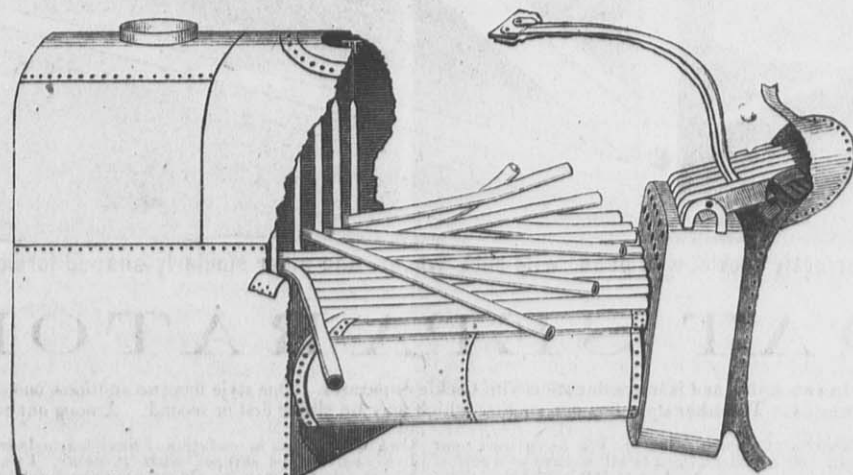


Fig. 7.

cold atmosphere, say at times as low as 60 deg. outside and 331 deg. inside?) and who can estimate the force that is added to the 90 lbs. internal pressure? But the shell was not entirely rigid and unyielding, the space above the back smoke-box must be flattened by the radial thrust of all the stays and braces around the smoke-box, which would bend the flange of the back head inward. The cracks that were caused by this action were plainly distinguishable from the fresh rupture, as was a crack or old fracture in the man-hole frame.

ONE OF THE LATEST INVENTIONS.—A new and improved mode of planting telegraph poles has recently been discovered and tried with success in Titusville, Pa. The ground being staked off at distances of about 200 feet apart, a man starts off with a pocketful of four-ounce cartridges containing a wonderful new explosive known as "electric powder," and with a crowbar in his hand. A hole is punched from four to five feet with the bar in a few minutes, and a cartridge dropped to the bottom with a fuse lighted with a match.

The operator then walks to the next stake, before reaching which, a low, dull thud is heard behind, a hole about the diameter of a flour barrel has been blown in the ground to a depth of four or five feet, and the work is followed up by a gang of men who plant the poles in the holes thus made, fill in with gravel and earth, and the job is complete. It matters not what soil is perforated with the bar, wet or dry, loam, clay, gravel, slate or boulders (provided the bar can be inserted), the effect is the same. A gang of four men, with poles delivered on the ground—one man to blast and three to erect the poles and tamp them—will put up from 100 to 150 poles a day of ten hours each. The cost, therefore, of this new and improved process is about two-thirds less than the ordinary method of planting telegraph poles, as now practiced.—*St. Louis Commercial Gazette.*

A REMEDY FOR DIPHTHERIA.—Here is a simple but excellent cure for diphtheria: Roast an egg very hard; take of alum or copperas each the size of a large hazelnut, and burn them in a skillet or on the rim of the stove, until it quits blistering; then put the yolk of the egg and a teaspoonful of sugar with the alum and copperas all together, and burn again, as above, slowly until black, stirring and mashing all the time. All children large enough can eat it as candy; for smaller children dissolve and swab. Good for any sore throat or sore mouth.

RECIPE FOR THE HAIR.—To prevent one's hair fading or turning gray while young, one-half pint Jamaica rum, one pint castor oil, half ounce tincture cantharides. The hair and scalp to be thoroughly washed with castile soap and water once a week at first, then less often, then the oil mixture applied to the scalp in small quantities, a tablespoonful being sufficient in most cases, and thoroughly rubbed with the hands; apply every other day. This stimulates and nourishes the hair admirably. The opiates given to infants are the chief cause of hair falling out or turning gray while young, in soothing syrups, etc.

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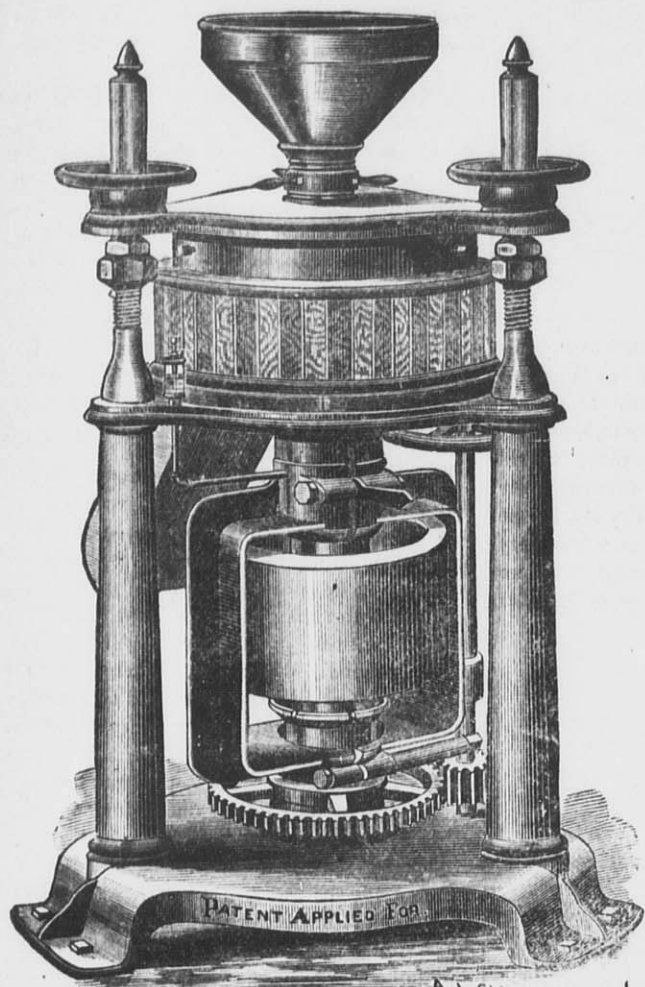
#### SNAKES.

Mr. J. H. Beeson, the well-known Central Branch contractor, gave *The Patriot* a pleasant call, and from him we learn the particulars of the most remarkable snake story we have heard. In the extension of the Central Branch road from Beloit to Cawker City the line passes through the town of Glen Elder. A short distance from Glen Elder, on the Solomon River, is a steep and rocky bluff, about fifty-five feet high, a large portion of which has to be blasted away to make room for the opad-bed. A few days ago, while the excavation was in progress, a blast of nitroglycerine caps and giant powder tore off an unusually large part of the bluff, and down the declivity there came writhing and rolling a bunch of snakes, which Mr. Beeson assures us was almost as large as a barrel. They were of different varieties, rattlesnakes predominating, with racers, adders, garters, etc. When first disturbed from their warm bed they were active and dangerous, but coming out into the severe cold they were soon completely harmless, and were killed by the men without much trouble, or covered up in the dump of earth and stone. But this is a very small portion of the story. Every day and every blast, since this first batch appeared, has brought another huge bundle of these reptiles. Every hour a moving, writhing lump comes rolling down the hills, only to separate at the foot, and what escape the laborer's shovel and pick crawl off to get covered up in the dump. Thousands of them have been unearthed and killed, and every blast brings thousands more, far rivaling in number the famous snake den of Concordia. Not a single case of snake bite has yet occurred, notwithstanding it is many times almost impossible to avoid stepping on them. There are no unusual monsters among them, the great majority being as large around as a man's wrist, and about three or three and a half feet long. The farmers for five miles around tell that this is the regular winter den of these venomous creatures, and that during the fall the snakes in that country, which are discovered, are headed in the direction of these bluffs, and the only way they can be turned from their course is to kill them. It is said to be one of the most remarkable sights ever looked upon, and hundreds from the surrounding country visit the quarries to see the curiosity.—*Atchison Patriot.*



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MILWAUKEE, WISCONSIN,  
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## Jonathan Mills'

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**MOST PERFECT DEVICE** ever INVENTED for REDUCING GRAIN to FLOUR.

**REQUIRES LESS POWER, LESS ROOM, and LESS ATTENTION**  
Than any other Mill Manufactured.

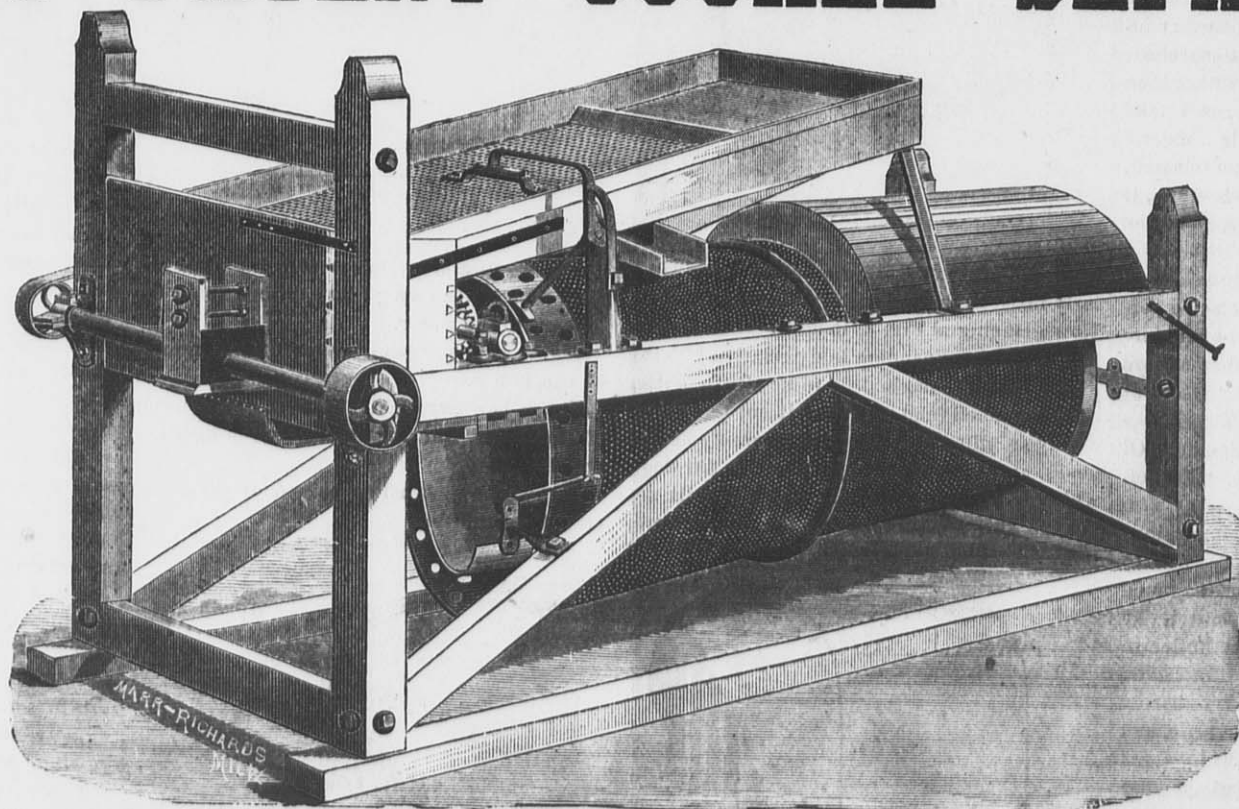
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# KURTH'S PATENT COCKLE SEPARATOR.

Cor. of Florida and Clinton Streets,



MILWAUKEE, WISCONSIN, U. S. A.

The above illustrated machine separates perfectly cockle, wild peas, wild buck-wheat, and other similarly-shaped foreign seeds from wheat. Requires but little power to run it. We also manufacture an

## OAT SEPARATOR,

Which is fully equal to any manufactured. This is made in two styles, and is in combination with Cockle Separator. One style has two suction, one operating on grain as it enters the machine and the other as it leaves it, each being independent of the other and easily regulated. The other style has one suction, which may be either first or second. Among our references we respectfully call attention to the following:

MINNEAPOLIS, Minn., Jan. 9, 1879.—Cockle Separator Manufacturing Company—Gents: We have used your Cockle Separator for the past three years, to our entire satisfaction. We commend them to all in want of a perfect machine. Yours truly,  
J. A. CHRISTIAN & CO.

MINNEAPOLIS, Minn., Jan. 16, 1879.—Cockle Separator Manufacturing Co., Milwaukee—Gents: In answer to your favor, would say that we have in use four of your Cockle Machines, and find them to be the only machines that we have yet seen that will separate the cockle from the wheat. The improved machines give us no trouble in any way. We shall want two more machines soon, to replace those burned in our Anchor Mill. Yours,  
CHAS. A. PILLSBURY & CO.

MINNEAPOLIS, Minn., Jan. 9, 1879.—Cockle Separator Manufacturing Co., Milwaukee: We are using two of Kurth's Patent Cockle Separators, and while they work somewhat to a disadvantage on the present crop, we know of nothing that will do the work as well. We consider them the best machine made. Yours truly,  
BULL & NEWTON.

AKRON O., Jan. 27, 1879.—Cockle Separator Manufacturing Co., Milwaukee—Gentlemen: Having three of your

Cockle Machines in operation, I have learned to appreciate their value, and trust that the fourth, ordered a day or two ago, will be shipped without delay. I want this in addition to the two machines I have already running on wheat, that I may be able to do absolutely perfect work, and cheerfully recommend them to those who aim at perfect work. On the other hand, I was free to admit, the other day, that your Separator is of no use to millers who argue that cockle makes good white flour, increases its bulk, and that therefore it is wasteful to take it out. Yours respectfully,  
FERD. SCHUMACHER.

OSWEGO, N. Y., Jan. 29, 1879.—Cockle Separator Manufacturing Co., Milwaukee—Gents: We are pleased to say that our use of your machines for the last two years, has been highly satisfactory, and especially do we like the new double suction machine, which does its work so perfectly that we would not like to do without it. Indeed we deem the machines indispensable in good milling, particularly with spring wheat. Your friends,  
PENFIELD, LYON & CO.

WHITEHALL, Wis., Dec. 11, 1878.—Cockle Separator Manufacturing Co., Milwaukee—Gentlemen: Allow us to say that the machine works to a charm, and that we calculate our flour is worth fifty cents more per barrel for the use of it. Respectfully yours,  
WHITEHALL MILL CO.

We make a machine especially for extracting Cockle and other similar Seeds from OATS and BARLEY, which is of great importance to oat-meal manufacturers, malsters, etc.

Send for Illustrated Catalogues, describing machine fully with diameter, capacity, etc., to

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## REJOICE YE MILLERS!

[Continued from page 83.]

vided for the introduction of a blast of air through perforated pipes into each reel as stated, for the purpose of keeping the meshes open, cooling, etc., without mentioning any effect to be produced toward removing pulverulent impurities, or even naming such impurities. Indeed, if that effect had been contemplated, the inventor would not have provided a cupola with two screens and brushes to arrest the escape of whatever was blown or wafted into the cupola and to cause that wafted matter to be thrown back or discharged directly into the first flour chest. If that wafted matter, whether flour dust or pulverulent impurities, was to be thus returned and mixed with the siftings of the first reel, it is evident that the invention had reference to the removal and separation of such matter from the flour. The devices involved necessarily a contrivance for the escape of the air forced into the reels; for an enforced current of the kind must have an outlet, otherwise disastrous results would follow, or the blasts cease to be operative. The screens in the cupola and the brushes for the purpose of returning the arrested particles into the reel chest indicate plainly enough that there was no thought of causing pulverulent impurities to escape through the cupola. This is made still more apparent from the fact that whatever escaped through the cupola, was in the normal operation of the connecting tube to be blown back into the very reels from which it had been just expelled. It was only in exceptional states of the weather that the valve in the tube was to be opened, but at all other times there was to be a return of the current escaping from the cupola into the reels carrying with said current whatever it contained. If then the purpose was to expel impurities, why such well arranged devices to force them back into the contents of the reels? Again, the "cant" ventilator of Cogswell & McKiernan and their air blasts through zinc jackets had been used at Lagonda and in the Barnett mill before the original patent No. 37,317 issued, and simultaneously with that patent Cochrane had procured for his "cant" ventilator, his patent No. 37,321; yet in the specifications and claims of No. 37,317, he omitted and it must have been *ex industria*, all reference to his No. 37,321, and substituted therefor his cupola, with screens and brushes. When he had ascertained in 1874, that his devices as referred to in the original patent would not purify middlings nor essentially aid in so doing, he interjected into his specifications for a reissue the rejected device No. 37,321. The testimony sufficiently explains why from his experimenting at Lagonda and in the first Barnett mill he discarded the "cant" ventilator, independent of its anticipation by Cogswell & McKiernan. The devices by which the improved method of bolting was to be carried on so far as air was concerned, looked to an enforced current, or blast operating from within the reels outward, and not by induced currents, operating from without, through the screens inward or upward as in flat and vibrating sieves.

Whatever construction may be properly put on the words, "combined operations of screening and blowing," it is obvious that the original invention contemplated a blast of air from within the reels, whereby its force should be directed not only through the meal as it was whirled around inside the reels, but also against the meshes of the reels, tending to force through whatever was small enough to pass. If the flour dust was thus forced through and wafted into the cupola, while the heavier particles, small enough to pass, fell by their greater specific gravity into the conveyors, the extremely comminuted particles of the integuments of the wheat-berry, or of its cell-walls, would, like the flour-dust, pass into the cupola by force of the blast, there to be arrested and brushed back into the flour, or returned through the tube into the reels, to be again and again whirled in and out in a continuous round. The many changes made by Cochrane and Warder & Barnett, after the original patent issued, and also after the reissued patent was granted, in order to adjust the devices referred to in No. 37,317, to an induced current or suction, indicate very clearly that the idea or thought of a process for purifying middlings in an "intermediate" or any other stage, of the manufacture, by the combined operations of blowing and screening, was not originally in the mind of the inventor. The testimony is clear that when the Cochrane device or machine was re-arranged and altered so as to work by suction, the perforated pipes performed no function. The manner of inducing or drawing the air into

the reel chests by suction, and the operation of the reel screens, when suction was used, were the reverse of combined blowing and screening. It cannot be fairly said, in the light of facts and circumstances now in evidence, that those reverse modes of operating were substantially the same or immaterial changes, as to form or modes of accomplishing what the patent covered. Even after the reissue, No. 5,841, Cochrane and Warder & Barnett had to resort to important changes, as to the modes of introducing air into their reel chests; they abandoned the device of a cupola with screens and brushes, introduced practically a new tube and valve, left their perforated pipes functionless, and changed blasts into suction or enforced into induced currents. In brief, the essential changes in Cochrane's devices, as described in No. 37,317, which he was compelled to make, in order that a beneficial result might follow, so far as purifying middlings went, demonstrate that a process for purifying middlings and making therefrom a high grade of flour, superior to superfine, was not thought of by him in or before 1863.

But where can there be detected in No. 37,317 a suggestion either of a mode of purifying middlings by the combined operations of blowing and screening, or of an "intermediate" stage therefor, between the production of superfine flour and the regrinding of the middlings, where is or was there such an "intermediate" stage? It is contended that the screenings by the first reel were superfine flour, or, if not, perhaps the screenings also of a part or a whole of the second reel; and, consequently, the combined operations of blowing and screening in the third reel purified the middlings at that stage, which was intermediate the production of superfine flour and the regrinding of the middlings. But we have endeavored to show that the screenings of the third reel were less free from impurities than they would be if coarser meshes were used, the process of purification could not occur by the use of that reel, nor at that stage of the operations. There is suggested in the original patent neither the idea of purifying middlings at the intermediate stage mentioned, nor the use of the combined operations of screening and blowing for that specific purpose. It cannot be said that the mention of "white middlings" embodies such a conception, so that the reissue, without expansion, could cover the purification of middlings in the manner and at the stage claimed; for the term "white middlings" was well known to the art of milling long before, and also to the commercial world. The manner in which "white middlings" is referred to in the patent shows that the term was as one well known, and not as a new or special product of any superior value.

A comparison of the original and reissued patents, and an examination of Cochrane's contract with Warder & Barnett in 1860, also of the correspondence of the latter, and of the testimony concerning low and high grinding in connection with Cochrane's invention, will show that the purpose was as stated, viz., by the ordinary process of milling, through his method of bolting, to increase the yield of choice flour. He soon learned that higher grinding—or what Prof. Horsford's report terms "half-high milling"—was necessary to the production of the best quality of flour, or of that superior grade which he contracted to make. Instead of accomplishing the promised result by low grinding, from four bushels and twelve pounds of wheat, higher grinding was soon resorted to, requiring five bushels and twenty pounds of wheat per barrel. He complained to his millers, it is said, that they persisted in grinding too low, although that mode of grinding was necessary to make the required yield; and insisted that they should grind higher. It was well known in the art that high grinding made a better quality, but less quantity, of good flour; but Cochrane thought he could increase the quantity of choice flour by his process. Warder & Barnett, it seems, following, it may be, the suggestion of Cochrane, began the use of high grinding at an early day, and stated to their correspondents that certain shipments made were from grinding high, yet in one of their letters they then boasted that by the new method even spring wheat could not be ground too low to prevent its being "cleared up." The ordinary process of milling, in connection with which Cochrane's method of bolting was to be employed, must have been, if not low grinding, certainly not the high grinding used in defendant's mill, for the value of his method looked to the greater yield of choice flour.

The reissue says: "It is this intermediate treatment (between the separation of the superfine flour and the completion of the middlings flour by regrinding and rebolting) for the separation and removal of pulverulent im-

purities which distinguishes my improvement in the art from all before known modes of manufacture." In the original patent there is not only no such claim, but nothing is said about the removal of pulverulent or any other impurities, or any such intermediate treatment. A brief use of air in an expanded portion of one reel at Lagonda, operating as a separator, was soon abandoned in the course of the early experimenting, and hence in the original patent no use of air in the separator was mentioned.

The proof is that in the modern or present mode of purifying middlings the purification occurs in connection with what answers to Cochrane's separator, and in that connection a current of air is now employed, while Cochrane did not call for any blast of air at that stage of the process, and previous to regrinding. His plan or process was not to use blasts of air in connection with the separator, but to rely on the ordinary process of screening without the use of air blasts or currents. The reissue attempts to expand the original invention to cover, therefore, in connection with the separator, what he did not originally claim or suggest, in order that he might appropriate to himself what had been since discovered or used, outside of his invention. As the conclusion is reached that the reissued patent is void, it is unnecessary to consider whether the process claimed was anticipated in any of the various publications or by any of the persons or processes as set up by defendant. The question concerning "high milling," the French and economical processes as used in Europe, the connection of the Cabannes and other patents with such processes, and also of Gove's method and machine, would, if fully considered, involve a very elaborate investigation of details, and require for a clear presentation of their analyses, resort to numerous drawings and models.

If the reissue had been held valid, an embarrassing and delicate question would have arisen concerning the alleged infringement by the defendant. In the case of "Cochrane vs. Deener," the United States Supreme Court decided that the Welch patent was an infringement of Cochrane's. That Court had before it, not only the process patent of Cochrane, but also his patents for machines, and to what extent this Court, under the circumstances, should venture to enter upon the subject anew, if an investigation as to that point were needed, might be doubtful. But if an appeal is taken, that Court will have before it in this suit the large amount of new evidence introduced; in the light of which it can determine for itself whether it will review its former opinion or not. Were it necessary for a decision on that point to be now made, and were it open for our consideration, we might possibly reach a different conclusion.

**HOW GROWING CORN MIXES.**—The manner in which corn mixes is as follows: The pollen falls from the tassel on to the silk, which is thereby inoculated; and each thread or fiber of silk is attached to a white hull on the cob, where the kernel is grown complete. Now if the pollen should miss one thread of silk, there will never be corn where that silk is attached to the cob. Plant two sorts (not varieties) of corn side by side, and if the pollen falls from one kind on to the silks of the other kind, the kernel thereby produced, will be of the nature of both kinds; although the color may be like either sort planted. No man is smart enough to unmix these two sorts of corn. Plant it twenty years and then you will see both kinds plainly.

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## EXPLOSIONS FROM COMBUSTIBLE DUST.

We give below a very important and exceedingly interesting report of a lecture by Prof. L. W. Peck, printed in the *Popular Science Monthly* for December. Prof. Peck, it will be remembered, made a series of experiments showing the nature of the explosions by which the Minneapolis flour mills were destroyed some time since. The results of these experiments are now embodied in a lecture, which was delivered on June 1st, 1878, at Association Hall, in Minneapolis, Minn. The conclusions reached are of so important a character, and are of so much interest to almost all classes of people, especially those who have anything to do with combustible substances, or with the fitting up of heating apparatus in places where there are large quantities of combustible dust, that we give the lecture entire. The professor said:

I wish to demonstrate to you this evening, by a few simple experiments, the fact that all combustible material when finally divided, forming a dust or powder, will, under proper conditions, burn with explosive rapidity. If a large log of wood were ignited it might burn a week before being entirely consumed; split it up into cord-wood, and pile it up loosely, and it would burn in a couple of hours; again, split it into kindling-wood, pile loosely as before, and perhaps it would burn in less than an hour; cut it up into shavings and allow a strong wind to throw them into the air, or in any way keep the chips comparatively well separated from each other, and it might be entirely consumed in two or three minutes; or, finally, grind it up into a fine dust or power, blow it in such a manner that every particle is surrounded by air, and it would burn in less than a second.

Perhaps you have noticed that shavings and fire kindling will sometimes ignite so quickly in a stove that the covers will be slightly raised, the door forced open, or perhaps small flame will shoot out through the front damper. You have in such a case an explosion on a very small scale, similar to that of the Washburn, Diamond and Humboldt mills of this city on the night of May 2d, upon which occasion the rapid burning of hundreds of tons of flour, bran, etc., completely demolished the solid masonry walls, six feet thick, of the mills, and threw sheets of iron from the roof of the Washburn so high into the air that they were carried two miles by the wind before striking the ground.

Let us see now why such explosions occur. Wood has in it a large amount of carbon, the material of which charcoal is composed, and the air is about one-fifth oxygen. Now, at the ordinary temperature the carbon of the wood and the oxygen of the air do not combine, but when they are heated, as by friction, concentration of the sun's rays, chemical action as from a match, or in any other way, they combine to form carbonic acid gas. This chemical action produces a large additional amount of heat, which keeps up the action as long as there is any carbon and oxygen left to unite, and also makes the temperature of the gas which is formed very high. As the space occupied by the carbonic acid gas and that occupied by the oxygen which entered into the combination is the same at the same temperature, there would be no bursting if, after combination, the temperature were the same as before; but it is a fact, which you have all observed, that fuel in burning produces heat; it is also a fact that heat expands a gas, and it is this great amount of heat, taken up by the carbonic acid formed, that produces the immense pressure in all directions.

Let us return to our log of wood. There is exactly the same amount of heat and carbonic acid produced when complete combustion takes place in each of the cases of burning, the only difference being as to time. In the first case, the explosion or pushing aside of the surrounding air occupies a week, in the last only a second.

Snow-flakes fall gently upon your shoulders, and you are required to perform an insensible amount of work to resist the crushing effect of each flake; but, suppose that all the snow that has fallen upon your head and shoulders for the last ten years was welded together in one solid mass of ice, weighing perhaps one hundred pounds, and that it should descend with the velocity of a snow-flake upon you, an immense effort would be required to prevent its crushing you, even if you were able to withstand the shock at all. The work of many days would be concentrated into an instant.

So it is with burning wood; four or five cords of wood and a large stove will give you a roaring fire all the winter; the work done is manifested by the heat obtained, by the rush-



ing of hot gases up the chimney and of air from outside into the room through every crack. But if the wood were ground into a powder and scattered through all the house and burned instantly, the cracks, doors, windows and flues would not be sufficient to give vent to the hot gas, and the roof and sides of the house would be blown to pieces.

What is true of wood is also true of grains; also of vegetables, with their products when they contain carbon, with this exception—grain, either whole or ground, will not burn readily when in bulk. A fire could be built upon a binful of flour and kept burning for half a day without igniting the flour, it would char upon the surface, but it lies in such a compact mass that the air does not get access to it readily, hence it does not burn.

I wish to show you now how combustible dust will burn when blown into the air by means of a pair of ordinary hand bellows. I have here two boards, about 12 by 18 inches, nailed together, forming a V (see fig. 1). Just outside of the V an ordinary Bunsen's gas burner is placed, and within is a small handful of dust, taken from a sash and blind factory. Upon blowing it smartly with the bellows a cloud is formed about 15 feet high—extending in fact to the ceiling—which ignites from the lamp and produces a flash, very quick and exceedingly hot, resembling much a gun-powder flash. You will notice that a large amount of dust falls from all around the edge of the flame without burning; that is because it is not thick enough. Two things are necessary; first that each grain of dust be surrounded with air, so that it can get the oxygen required instantly; and secondly, that each grain shall be so near its neighbor that the flame will bridge over the space and pass the fire from particle to particle.

I think, after seeing the immense flame produced by such a small amount of fine saw and sand-paper dust, you will no longer wonder at the rapid spread of flames in furniture and similar factories. You know it is practically impossible to put out a fire after any headway is attained in these establishments; the draught produced will blow all the dust from walls and rafters into the air, and the building in an instant is a mass of flame. Perhaps

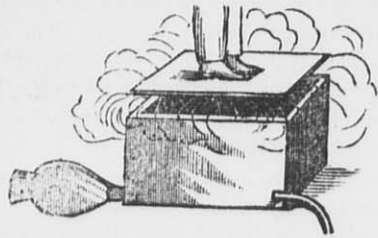


Fig. 1.

many of you remember the fire in the East Side saw mills a few years ago. Large masses of fine saw dust had probably collected upon the rafters, and the whole roof was perhaps filled with cobwebs loaded with dust. A fire started from one the torches used and shot through the mill with lightning-like rapidity, and, save for the fact that the ends and sides of the building were all open, there would have followed an explosion like that at the flour mills. As it was, the men had very great difficulty in escaping with their lives, notwithstanding that a short run in any direction would have taken them out of the mill. It is very evident that too great care cannot be taken to keep all such factories and mills as free from dust as possible.

I will now blow some ordinary starch into the air in the same way and you notice the flame is more vivid than in the last experiment, and, if you were in my position you would notice that the heat produced is much greater. Notice now that this powdered sugar burns in the same way.

You will see from the experiments further on, that three-quarters of an ounce of starch will throw a box weighing six pounds easily twenty feet into the air, and that half an ounce burned in a box will throw up the cover three inches with a heavy man standing upon it.

With these facts, which I have demonstrated before you, no one need regard as a mystery the Barclay street explosion in New York City, where a candy manufactory, in which large amounts of starch and sugar might in many ways be thrown into the air by minor disturbances, took fire and completely wrecked a building and destroyed many lives.

I will now burn in the same way some buckwheat, which as you will observe, gives a very large blaze; now some corn meal, which is too coarse to burn as well; now some rye flour, which burns much better than the corn; now some oatmeal, the finer part of which only burns; and so I might continue with all sorts of finely ground vegetable material.

Let us take up now the products of the

manufacture of flour from wheat. There were between 300 and 400 tons of these materials (upon which I am now to experiment), in the Washburn mill at the time of the explosion, and there was a corresponding amount in the Diamond and Humboldt mills, which, by their sudden burning, produced the second and third shocks heard directly following the explosion of the larger mill.

The wheat is first placed in a machine, where it is rattled violently and brushed. At the same time a strong draught of air, passes through it, taking up all the fine dust, straw, etc., and conveying it through a spout to a

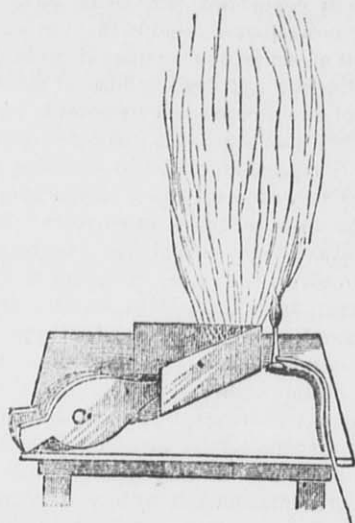


Fig. 2.

room known as the wheat-dust room, or perhaps more commonly it is blown directly out of the mill. You see some of this material; it looks like the wood-dust of the first experiment, and, as you see, burns with a quick and sudden flash when subjected to the same conditions.

Here, then, we have the first source of danger in a flour mill. A thick cloud of this dust, when conveyed through a spout by air, will burn in an instant if it takes fire; and, if there is any considerable amount of dust, as there would be if there were a dust-room, an explosion will follow which may become general if it stirs up a thick dust-cloud throughout the mill.

The wheat after it has been cleaned in this way goes to the crushers which are plain or fluted or iron porcelain rollers, working like the rollers in a rolling mill. The object of these rollers is, I believe, to break off the bran in as large pieces as possible, and to crush out or flatten the germ so that it can be separated with the bran from the rest of the meal.

The crushed wheat goes now to the stones, where so much heat is produced (average 135 Fahr.) that a large amount of steam is formed from the moisture in the materials. This steam would condense in the meal and interfere with the bolting, etc., if it were not removed. To effect this another draught of air and another spout are employed, and as might be expected, this current takes a large quantity of the very finest flour, called flour dust, with it. To save this a room is provided near the end of the spout, called the flour-dust house. The spout conveying steam and dust enters this room on one side, and another spout opposite leaves it, passing to the open air. It is in this comparatively dead air space that the dust settles and can be collected from the floor. Here is some of this material, which, as you see, when blown into the air, produces a vivid flash, extending from the table to the wall.

The evidence taken before the coroner's jury shows very clearly that it was this material that started the great explosion of May 2d.

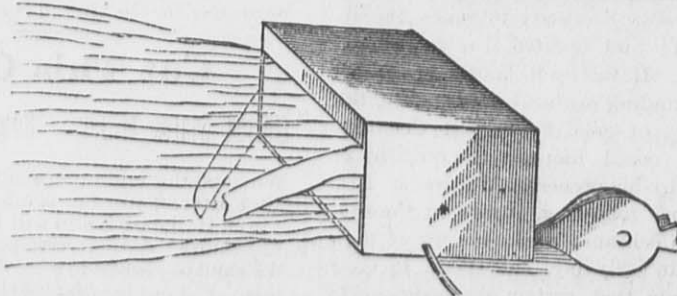


Fig. 4.

Just how the mill took fire will perhaps never be known, of course, but in all probability the stones either ran dry—that is, were without any meal between them—or some foreign substance, such as is produced by an emery wheel or a scissors-grinder's wheel. These sparks set fire to small wads of very hot dust, which, as soon as they were fanned into a blaze, communicated it to the spout and house full of dust. An eye-witness of the explosion first saw fire issuing from the corner of the mill where this flour-dust spout was situated, the end of the spout having probably been blown out. This fire was followed by a quick flash,

seen through all the windows of the floor upon which the flour-dust houses were situated, followed instantly by a flash in the second story, then the third story, and in rapid succession, fourth, fifth and sixth stories; then followed the great report produced when the immense stone walls were thrown out in all four directions, and the roof and part of the interior of the mill shot into the air like a rocket.

It would seem that a blaze is necessary to ignite the mixture, for I have tried powerful electric sparks from a machine, and from a battery of Leyden jars; also incandescent platinum wire in a galvanic circuit, and glowing charcoal, without producing any fire, however thick the dust might be. Perhaps, however, under more favorable conditions the dust would ignite directly from sparks, but it seems very improbable.

Let us continue now with the process through which the ground wheat is made to pass. From the stones it is conveyed to the bolting reels, where the very finest is sifted out first, and we obtain a grade of flour; after the finer material is sifted out it goes to a coarser bolt, where the "middlings," as it is called, passes through, leaving the bran, which comes out at the end of the reel. The middlings, as it comes from the bolts, has fine bran and dust in it, and to purify it, it is subjected to an operation similar to that of cleaning the wheat; that is, in the middlings purifier it is subject to a draft of air which takes away all the light bran and dust, leaving the heavier material (purified middlings), which goes again to the stones to be ground into flour.

Here is some of the dust from these "middlings machine;" you observe it burns as the other materials burned, quickly and with intense heat.

Here is some of the purified middlings. Each grain is comparatively large and heavy, making it difficult to blow it well into the air, but as the blaze produced by each particle is quite large, a flash is produced which does not differ materially from the others.

Here is some of the general dust of the mill, that is, dust swept up from the floor, walls, beams, etc. You will see it acts in all respects like the other substances.

And, finally, here is some of the flour taken this afternoon from the flour sack at home, it burns, you observe, if possible with even more energy than the other kinds of dust. I have performed a few experiments which I will now repeat, which will illustrate to you the immense power that these materials exert when burned in a confined space. This box (fig. 2) has a capacity of two cubic feet; the cover has a strip three inches deep nailed around it, so that it telescopes into the box; there is in this lower corner an opening for the nozzle of the bellows, in this an opening for the tube to the lamp. I place now a little flour in the corner, light the lamp, and my assistant places the cover upon the box and steps upon it. Take notice that upon blowing through the hole, and filling the box with a cloud of flour, the cover comes up suddenly, man and all, until the hot gas gets a vent, and a stream of fire shoots out in all directions.

Here (fig. 3) is a box of three cubic feet capacity, including this spout, nine inches square and fifteen inches long, coming from the top of it, at the ends doors are arranged closed like steam-boiler man-holes; openings for light and bellows are arranged as in the previous box.

Here is a box, weighing six pounds, that will just slip over the spout; it has a rope lest it should strike the wall after the explosion.

the spout five thicknesses of newspaper: upon igniting a boxful of dust as before the paper is thrown violently into the air, accompanied by a loud report as it bursts.

For the last experiment I have a box of four cubic feet capacity (fig. 4); five sides are one and a half inch thick, the remaining side one-quarter inch. Upon igniting the dust in this box, filled as in the other cases, the quarter inch side bursts, and a stream of fire shoots out halfway across the stage.

One pound of carbon and two and two-thirds pounds of oxygen, when they combine to produce carbonic acid, will evolve heat enough if it were applied through a perfect heat-engine, to raise 562 tons ten feet high; if, therefore, 40 per cent of flour is carbon, it would require two and a half pounds to accomplish this result, if an engine from which there would be absolutely no radiation, conduction, or loss of heat in any way were a practical possibility. Let us see how much air would be required to supply oxygen enough. Under ordinary conditions every 100 cubic inches of air contains 7.13 grains of oxygen, from which we find that 151½ cubic feet of air would be required for the two and two-thirds pounds of oxygen. Hence the two and a half pounds of flour must be equally distributed as a dust through 151½ cubic feet of air in order to produce the most powerful result.

If 41 ounces of flour require 151 cubic feet of air for perfect combustion, one cubic foot of air will supply oxygen enough for 40-151 of an ounce of flour. Hence our box, which lifts the man so readily, burns one-half ounce of flour or less; and the other, which throws the box into the air, three-quarters of an ounce, unless, as I think quite probable, an additional amount of air is drawn through the cracks as soon as the vent is opened at the top of the

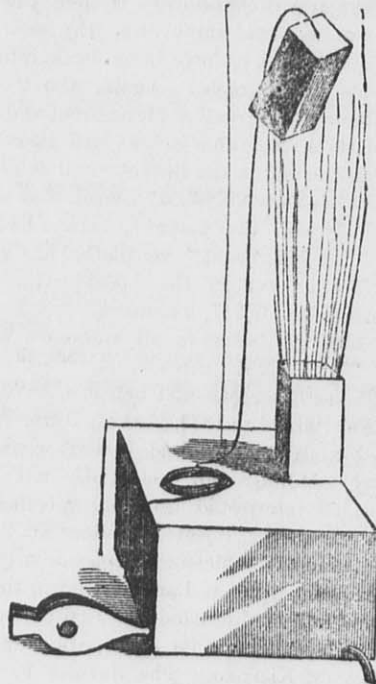


Fig. 3.

box. In fact, these experiments work better if a few small holes are made near the bottom of the boxes. It may be worthy of mention here, as a point of interest to insurance companies that, in all dust explosions, a fire precedes the explosion in every case. The dust must burn before the heat that produces the immense expansive force is generated.

Too great precaution cannot be taken in all kinds of manufactories, where combustible dust is produced, against fire, especially in those establishments where it is conveyed in thick clouds by air-drafts through spouts and rooms.

**VARNISH FOR PATTERNS.**—A varnish for foundry patterns and machinery has been patented in Germany, which dries as soon as put on, gives the patterns a smooth surface, thus insuring an easy slip out of the mould, and prevents the patterns from warping, shrinking or swelling, as it is perfectly impervious to moisture. This varnish is prepared as follows: Place in a vessel 50 pounds of shellac, 10 pounds of manilla copal, and 10 pounds of Zanguebar copal, and heat it by the external application of steam for four or six hours, stirring it in the meantime constantly. Then add 150 parts of the finest potato spirit, and heat the whole during four hours to 190 deg. Fah. This liquid is then dyed by the addition of orange color, and can then be used for painting the patterns. When used for painting and glazing machinery, the varnish may consist of 35 pounds of shellac, 5 pounds of cocoriel copal, 10 pounds of Zanguebar copal, and 150 pounds of spirit. Similar varnish to the above is used quite extensively by pattern-makers in this country, and much of the superior appearance of American castings is due to its use.



## RECENT PATENTS.

The following patents were issued from the United States Patent Office, Feb. 11th, 1879:

Corn planter, R. H. Avery, Galesburg, Ill.  
Steam condensing and feed water heating apparatus, Benj. T. Babbitt, New York.  
Seed planter, Jos. C. Barlow, Quincy, Ill.  
Check row planter, Moses J. Barron, Sangamon county, Ill.  
Planter and cultivator, T. M. Hunt, Caldwell, Texas.  
Stone-dressing machine, John D. Brunton, Balmsea, England.  
Engine governor, F. Burns, Philadelphia.  
Water wheel, Armisted Burwell, Mecklenburg county, Va.  
Combined grinding mill and feed cutter, Thos. Clarke, Truro, Nova Scotia, Canada.  
Weighing scales, P. M. Cummings, Lyons, Iowa.  
Millstone driver, J. C. Dane, LaCrosse, Wis.  
Strawband grain binder, George Davis, Milford, Mich.  
Feed steamer and generator, Chas. Gordon, Adrian, Mich.  
Rotary engine, John Henderson, Jr., Watertown, Conn.  
Water elevator bucket, Steven W. Kershner, Indianapolis, Ind.  
Traction engine wheel, Jacob Kirchhoffer, Walla Walla, Wash. Ter.  
Wind engine, J. C. Kuempel, Clayton, Iowa.  
Corn planter, Thos. B. McConoughey, Newark, Del.  
Water wheel gate, James S. Meherg, Coosa county, Ala.  
Wind wheel, Jacob T. Mider, Wathena, Ks.  
Knott-tier for grain binders, Henry E. Pridmore, Brockport, Ill.  
Millstone setting, W. L. Teter, Philadelphia.  
Middlings separator, H. G. Clouser, Millersburg, Penn.  
Cut-off gearing, Nelson W. Twip, New Haven, Conn.  
Rotary engine, Geo. C. Yarborough, Baldwin county, Ala.

## ACTION OF WISCONSIN MILLERS.

They endorse the Expulsion of Stannard and Kehlor by the Missouri Millers' Association.

March 3d, an adjourned meeting of the Milwaukee members of the State Millers' Association was held in the office of Secretary Langson, in the Chamber of Commerce building. The object of the gathering was to take action in regard to the course of ex-Gov. Stannard, of St. Louis, a member of the Missouri Association, whose case the millers of the country have been assisting to defend against the demands of the Cochrane patents, and who while the case was being heard in Court entered into a compromise and settled with the ring. The following preamble and resolutions were offered and unanimously adopted:

Whereas, There have been organized in the several wheat-growing States associations composed exclusively of the manufacturers of flour, for the purpose of defending each and all their members against claims for royalty brought by parties under what is known as the Cochrane Patents, which are believed to be unjust and fraudulent; and

Whereas, Each State so organized has assisted with the money necessary to defend these claims before the Courts of the country, in order that a decision might be reached, to determine whether these claims are just or unjust; and,

Whereas, Suits were brought against parties, members of the State Associations, in Wisconsin and Minnesota, which suits have been contested with the aid of funds furnished by other States, in accordance with agreements entered into by the delegates from all the State organizations; and,

Whereas, Parties to this agreement in St. Louis, viz., R. O. Stannard & Co., against whom suit was brought in the sum of \$150,000 damages for infringement of said Cochrane patents, have compromised with the owners of said claims, contrary to their associates, thereby breaking faith with all members of their own and other associations who came forward—when these defendants were in distress and threatened with heavy damages—with money necessary to prevent the collection of such damages; and,

Whereas, The Millers' Association of Wisconsin, without any suit to defend, having contributed to this defense of Stannard & Co., and their associates, the sum of \$8,000, which sum has been jeopardized by the action of said Stannard & Co., in settling with the "Cochrane ring," thereby breaking faith with and betraying their friends, who came liberally to their defense when in distress; therefore be it

Resolved, By the members of the Wisconsin State Millers' Association representing at this meeting nearly 200 run of burrs, that we heartily approve the action of the Missouri State Association in expelling Messrs. Stannard & Co., and Messrs. Kehlor Bros. from membership in their association, and regret there is no worse punishment or disgrace that can be meted out to them.

Resolved, That we approve the course of Messrs. Bowe, Smith, Godard and others in expelling said parties, and that Wisconsin in the future as in the past will stand ready to assist in the fight against this and other fraudulent claims.

Resolved, That we demand the expulsion of Messrs. Stannard & Co. and Kehlor Bros. from membership in the National Association.

Resolved, That the Association has full

faith in the justness of our opposition to the claims of the "Cochrane ring," and believe that the decision when reached in the St. Louis cases will be against the demands of the "ring."

Resolved, That a copy of these resolutions be forwarded to the loyal millers of St. Louis, the milling papers of the country, and the daily press of this city.

The meeting adjourned without further business.

**SEED CORN.**—Good seed must go hand in hand with good cultivation, but with good seed and good cultivation our corn yield ought certainly to be doubled. For instance I find it easy to select ears of corn. Seventy of these ears would make a bushel. Corn planted in hills four feet apart each way gives 2,722 hills to the acre. If each of these hills should produce three such ears of corn the acre would yield 116 bushels. Now I fully believe that at least nine farms out of every ten in our State are capable of a yield very nearly approaching this, but it is only to be attained through that higher education which shall induce more thorough work and closer attention to details of every description than is now given by one farmer of ten thousand.

Frank Nicolai, of Jordan, Minn., is busy rebuilding his mill lately burned. It will contain eight run of stone and several sets of rolls. Chas. Rudolph will be the head miller.

**GRANULATED WHEAT BREAD.**—Take a pint of actively-boiling water, salted slightly, and add enough fine granulated wheat flour to form a thin mush; to this stir in a quart of tepid water, a small piece of butter, two eggs, well beaten, one-half teaspoon of New Orleans molasses, and one-half cake compressed yeast dissolved in a little water; thicken it as stiff as it can be stirred with a spoon with cold-blast flour, and put each loaf in a separate pan; let it stand until it puffs up nicely, and then bake in a quick oven two hours.

## A GREAT

## Milling Invention

## SUCCESS ATTAINED AT LAST.

To Mill Owners: I have invented, and secured by letters patent, No. 211,244, an Improved Method for Grinding the Grinding Surfaces of Mill-Stones. Having been practically engaged in the milling and mill stone business for over 30 years I have learned the great value of having a perfectly true face on grinding stones, and during the past 10 years I have expended a great deal of time and money in making my invention and securing my patent. The very foundation of successful milling is in the proper treatment and use of the mill-stone. A true face will make even, uniform flour and a large percentage of middlings, while an uneven stone will cause uneven grinding and poor flour, which no purifier or system of bolting will rectify. With a true face on the mill-stone the miller can set his iron right, can trim the spindle right, can get the level right, and not half the work in dressing will be necessary. This is a matter of fact.

## UTMOST IMPORTANCE TO MILLERS,

And I respectfully call your attention to it, and invite correspondence.

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Gerlach & Dittmarch, Milwaukee, Wis.  
Huntingdon & Koch, Barton, Wis.  
Sni-h & Co., Grafton, Wis.  
Folker & Jonas, Saukville, Wis.  
Geo. Guettler, Thiensville, Wis.  
Milwaukee Milling Co., Milwaukee, Wis.  
Orville Hathaway, Oconomowoc, Wis.  
F. Miller & Co. (2 mills), Watertown, Wis.  
Barnes & Hodson, Janesville, Wis.  
Coman & Morrison, Fox Lake, Wis.  
E. R. Hoyt & Son, Beaver Dam, Wis.  
H. G. Mathews, Brandon, Wis.  
Filer, Stowell & Co., Milwaukee, Wis.

I have placed my price for rights for mills at an extremely low figure, considering the value of my invention, so as to bring it within the reach of all. For further information and correspondence address

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722 Fourth St., Milwaukee, Wis.

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Superior Wheat Scouring and Brush Machines. General Mill Furnishings.

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A LADY of experience gives advice on kissing to a younger lady friend as follows: "Be frugal in your bestowals of such favors. In the first place I would cut off all uncles, cousins and brothers-in-law; let them kiss their own wives and daughters; and I would not kiss the minister, or the doctor, or the lawyer who gets you a divorce." You see this lady understands her business and does not leave out the editor; he of all others needs these osculatory attentions to "lighten up the gloom;" she's a jolly, sensible woman, with a heart in the right place.—*Marshalltown Times.*

## Situations Wanted, etc.

Millers, Engineers, Mechanics, etc., wanting situations, or mill-owners or manufacturers wanting employees, can have their cards inserted under this head for 50 cents per insertion, cash with order.

**WANTED**—A miller with \$1,500 capital to take an interest in New Process water mill. Write at once for particulars to S. & C., care United States Miller, Milwaukee, Wis. dec

**SITUATION WANTED**—I have had two years practical experience in a good flour mill, and want a situation where I can finish learning the trade. I can furnish first-class reference. Address  
GHO. P. WANDER, 512 Spring St.,  
Buffalo, N. Y. mr3t

**WANTED**—Situation as head or assistant miller in some first-class firm. Twenty years' experience in steam and water mills. Speak German and English. Salary an after consideration. Address  
LOUIS HALLER, Hicksville, O. ap\*

**WANTED**—A situation as mechanical draughtsman by a graduate civil engineer who has had thorough experience in marine and stationary engine work and general mill machinery. Good references furnished. Address C. E., Box 331, Bay City, Mich. ap\*

**WANTED**—Permanent situation by a miller of 18 years' experience, 12 years in the Northwest; understands "New Process;" am industrious, honest, and capable, and have a family; a place where there are good schools desired; can furnish references. Address C. C. A., care United States Miller. ap3t

**WANTED**—A first-class foreman to take charge of a stone shop; must be perfectly competent to superintend bolting and finishing burr stone. Best references required, and none but experienced men having acted as foremen need apply. A good chance for the right man. Address F. J. S., care United States Miller. ap1t

**WANTED**—Millers out of employment and proprietors of mills to act as agents for the sale of the Ashland Patent Adjustable Sack Holder; one of the best selling articles out. Exclusive territory given. Sample sent to those who wish agency or to use on the receipt of \$1.50. Address  
L. JEFF. SPRENGLE,  
Ashland, Ohio. ap2t

**WANTED**—A situation as Oatmeal Miller by a thoroughly practical, competent man, sober and steady; understands all the different grades for home and foreign markets; the drying and handling of oats in all its details; has had a long experience and can come well recommended. Address "Oatmeal Miller," care of United States Miller, Milwaukee, Wis. ap3t

**WANTED**—A situation by a miller of long experience in milling in both Germany and America. Has filled responsible positions in several well-known mills in this country. Will guarantee satisfaction. Is married, of steady habits, and can furnish reference as to ability and character. Address at once,  
J. M. B., care United States Miller,  
Milwaukee, Wis. feblt

## For Sale or Exchange.

Advertisements under this head \$2 per insertion, cash with order.

**FOR SALE**—Cheap—A two-run merchant mill in a good wheat country, on the Illinois Central R. R. For particulars, address  
W. GILBREATH,  
Elkville, Jackson Co., Ill. feblt

**FOR SALE**—Three-run water mill and 63 acres of land; good house and barn; plenty of custom. Cheap for cash, or half cash.  
JNO. F. MCGUIRE,  
Clinton, Iowa. mrlt

**FOR SALE**—Two-run steam mill; best run of custom in the county; two houses and barn. Pays 10 per cent on \$8,000. Cheap for cash, or half cash.  
JNO. F. MCGUIRE,  
Clinton, Iowa. mrlt

**WANTED**—To buy or rent a mill, by a practical miller thoroughly versed in merchant and grist work. Talks both English and German, and can give best of references. Address,  
S. KAMMERER,  
Fountain City, Buffalo Co., Wis. mr\*

**WANTED**—A good steam flouring mill at Cawker City, Kansas. The location is exceptionally good. The best of wheat and other grains produced in great abundance. The investment will surely make a good return. The Atchison, Cawker City & Denver Railroad will be completed to this point on or before June 1st, 1879. Parties desiring to secure a good location may address for any further information,  
EDMUND O. GARRETT,  
Cawker City, Mitchell Co., Kan. feblt

**FOR SALE**—A grist mill with two run of stone, on one of the best and clearest water powers in the country. Two houses—one a hotel—barns, sheds, hog pen, ten lots with fine fruit trees, in the village of Bird, Oceana Co., Mich. The whole can be had for the give away price of \$4,500, or one-half for \$2,500. Being in other business the subscriber feels compelled to sell. Address at once,  
J. PALMITER,  
Hart, Oceana Co., Mich. mr\*

**FOR SALE**—A superior mill site in southern part of Illinois, suitable for a custom and merchant mill. The location is in one of the best wheat-growing sections of the State, and enjoys railroad facilities to all points East and South. Also one engine and two 4-hp boilers in perfect condition. All will be sold at a bargain. For full particulars, please address,  
IMBS, MEYER & CO., 120 & 122 S. Main St.,  
St. Louis, Mo. feblt

**FOR SALE**—A flour mill on Pawpaw Creek, in Mecklenburg Co., N. C. Mill is a three-story building, first-story rock, second and third wood. Rock dam. Two run of stone, one for wheat and one for corn, with other machinery, run by 17-foot overshot water-wheel. Also saw mill with improved circular saws, etc.; 194 acres of land go with the property. Price, \$4,100. This is a fine opportunity for an enterprising miller to make a fortune. Address  
DAWSON & CO.,  
Charlotte, N. C. jan\*

**FOR SALE OR RENT**—One of the best steam flouring mills in the State. Four stories, brick and stone, slate roof, four run of burr. Adapted to new process. Everything new. Best wheat region of the State. Fuel cheap, water plentiful. Near depot and has side track, coopers shop, wagon and stock yards. Pleasant town of 2,000 inhabitants. Satisfactory reason given—neither of us know anything whatever about milling. Terms easy. Fine bargain. Address  
C. H. HEARD & SON,  
McLeansboro, Ill. feblt

**FLOUR MILL WANTED**—In Exchange—I have the exclusive right of 20 Counties in the State of Michigan to manufacture and sell ELLIOTT'S IMPROVED or CENTENAL HAWK, with \$1,000 worth of Harrows on hand ready for the Spring Market, which I wish to trade for a good Custom Mill. Would be willing to take property with some encumbrances. The Harrow mentioned is the best one yet manufactured, sells readily as every farmer wants one, and yields a net profit of 200 per cent on cost of manufacture. Being a practical miller I prefer to confine myself to that business. Address  
J. M. SHACKLETON,  
Plainwell, Allegan Co., Mich. jan2t

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Advertisements under this head \$2 per insertion, cash with order.

**FOR SALE**—A grain elevator in the best grain-growing section of Kansas. County seat. Splendid business. Address  
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Clyde, Kansas. ap\*

**FOR SALE**—A whole or a half interest in a good three-run steam mill in a good wheat country. Mill doing a good business. Half will be sold very cheap. Address  
ROGERS & RAMBACH,  
West Liberty, Iowa. feblt

**FOR SALE**—Steam power saw mill for sale cheap, and on reasonable terms. Mill is in good location, and is doing a good business. Satisfactory reasons will be given for selling. Call on, or address,  
SMITH & TUCKER,  
Cawker City, Kan. feblt

**FOR SALE**—Custom and merchant mill; steam power; three run of burrs; the mill has a good run of custom and the flour a good reputation; mill is situated in a fine wheat country and at the junction of three railroads; satisfactory reasons given for wishing to sell. For particulars address Box 106, Altamont, Effingham county, Ill. apt\*

**FOR SALE**—A flouring mill, saw mill and 265 acres of land; 55 acres improved at a price to suit the times for one-half cash; balance long time. The water power is unsurpassed; two run of burrs with necessary machinery. Mill thoroughly repaired last season. Good wheat country. Situated at Orange, Juneau Co., Wis., on the M. & St. P. R. R. Address  
J. G. EVANS,  
Orange, Juneau Co., Wis. mrlt

**FOR SALE**—Alabama Flour Mill—Two-run Custom and Merchant Mill in Springville, Alabama, complete. Excellent location. Good trade. Splendid climate. Mill close to a perpetual cold spring, furnishing water enough to run 15 or 20 horse-power turbine with 15 foot fall. Mill now uses steam power. Satisfactory reasons given for selling. Terms, \$1,500 down and \$500 in 12 months. Must be closed out soon. For further information address  
A. J. ADERHOLD,  
Springville, Ala. jan

**FOR SALE**—A good custom and merchant mill, three stories high, built of stone, with three run of burrs; good water power, close to railroad. Also two dwelling houses and all necessary outer buildings, all covered with slate. The mill has all been rebuilt, with middling purifier and all necessary machinery. The mill is now running day and night. Good grain country. This property is a splendid home and business, and will be sold very cheap. For particulars call on or address  
E. G. GILBERT,  
Raubsville, Northampton Co., Pa. feblt

**FOR SALE**—A 2-run flour mill. Good burrs and bolts in perfect order and doing a good business. Water-power has 14 feet fall, fed by large lake. No ice or floods to contend with. The mill makes good flour and there is plenty of grain in the vicinity. The mill lot contains 4½ acres in the town with two dwelling houses, large barn and shed. With the mill will be sold 80 acres of timber land one mile from town. Terms: \$2,000 cash down, and balance in store goods or on five years time. Address for full particulars,  
WM. SKINNER,  
Mount Morris, Waushara Co., Wis. feblt

**FOR SALE**—Flour and Saw Mill—One-half interest in a first-class three-run Steam Flour and Saw Mill. The saw mill is a double rotary, with gang edger, cut-off and bolt saws and shingle machine. It has been built but 18 months, and is in as good a wheat country as there is in the State. My object in selling is to have cash in hand to put in a good country store in connection with mill. Would prefer to sell to a miller or a man that is well posted in store business who can command from \$6,000 to \$7,000 and furnish good references. I will guarantee good margin to the trade. Address all communications to  
A. J. FULLERTON,  
Bonduel, Shawano Co., Wis. feblt

**FOR SALE**—Best Mill in Southern Pennsylvania—This mill, situated in a small village within five miles of Broad Top coal fields, was recently rebuilt with all modern improvements and is in good repair. Mill is on a never-failing stream, with 30 feet head and is propelled by two turbine wheels. Has three run of burrs and one run of choppers. Building is frame, 42 by 50, and four stories high. Machinery is suited for making either merchant or custom work. Belonging to the mill are a good saw mill, 180 acres of farm land, 100 acres of valuable bark-timber land, three dwellings and a store-room. The owner of the above property will also sell three separate tracts of good bark and fine timber land, containing 400, 280 and 72 acres. For further particulars call on or address,  
WILSON BERGSTRESSER,  
New Grenada, Fulton Co., Pa. feblt

**FOR SALE OR RENT**—A five-run steam mill, located at Manchester, St. Louis Co., Mo., eighteen miles west of the city of St. Louis. It is located in a never-failing wheat country and is supplied directly by the farmers at reasonable figures. The mill has been run profitably for the past sixteen years. Was rebuilt on a thorough and convenient plan six years ago. Good reasons for wishing to sell or rent. Mill is running to its full capacity and is doing a good business. No competition, no railroads. All of the offal sold at the mill, and a large trade established for the flour. Will be sold to parties having part cash; long time given for remainder at a reasonable rate of interest, or will rent on reasonable terms. Address or call on the proprietor,  
JACOB SCHREINER,  
Manchester, Mo. feblt

**FOR SALE**—A four-run steam flouring mill, all in first-class running order. Three 34 foot burrs for wheat and one 34 foot chopping burr, one Eureka wheat cleaner and a Eureka smelter, Garden City middlings purifier, Excelsior bran duster, Eureka flour packer and all other machinery necessary to complete a first-class mill. Two 28-hp boilers, 65-horse power engine. Still-well heater. Frame building and seven desirable town lots belonging to the property. Side track of A. T. & S. Railroad close by the mill, which is located in the city of Sterling, Rice Co., Kansas, in the midst of the best wheat district in the Arkansas valley. The parties owning the mill are not practical millers, and are engaged in other business. They will sell the property low and on easy terms. Address  
LANDIS & HOLLINGER,  
Sterling, Rice Co., Kan. feblt

**FOR SALE**—We offer for sale the steam merchant flouring mill located at Peterson, Fillmore county, Minn., one of the finest wheat growing countries in the State. The mill is situated on the Southern Minnesota railroad, with side track to the door of the mill, thus giving the best of facilities for grinding wheat in transit. This road is being rapidly extended westward into the best wheat growing section in the Northwest, so that the facilities for obtaining choice milling wheat are growing better each year. This mill was built in 1876; is 40 x 60 feet; three and one-half stories high above the basement. Contains eight run of burrs, with all the modern machinery; brick boiler and engine rooms, practically fire-proof, adjoining the mill 30 x 40 feet; two boilers and 22 x 34 inch cut-off engine built by us. The mill has a capacity of 150 barrels per day, and has a well established trade, the flour commanding the highest price in the market. This property will be sold cheap as we have no use for it. For further particulars inquire of  
FILLER, STOWELL & CO.,  
Cream City Iron Works, Milwaukee, Wis. mrlt

**FOR SALE**—A Texas flour mill and land; a rare bargain. I offer my steam flouring mill at Trinity Mills, a depot 16 miles from Dallas, Texas, and on the Dallas & Wichita Railroad, for sale at a great sacrifice. The mill has three run of stone, two for wheat and one for corn. It has a capacity of 100 barrels per 24 hours; fine tubular boiler and good but old style engine; stones driven by beveled gear; mill built four years ago and cost over \$9,000. With the mill I will sell 420 acres or more of land, on which at the mill are two dwellings of four rooms each and a large store-house; about 50 acres of superior prairie soil for field crops, fruit and vegetables; the balance is in timber and will afford perpetual fuel for the mill and fine pasturage. It is located on the Elm Fork of Trinity River, and is exceedingly fertile. I will sell the whole to a CASH purchaser for \$15 per acre—net more than the value of the land. There is plenty of wheat raised in the county. Satisfactory reasons for selling. Address immediately  
DR. ROY B. SCOTT, Trinity Mills, Texas. apt\*

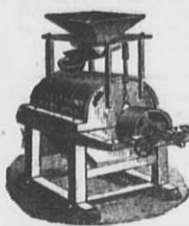
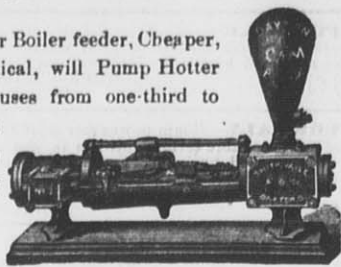


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It is a better Boiler feeder, Cheaper, More Economical, will Pump Hotter Water, and uses from one-third to one-half less steam than any other Pump.



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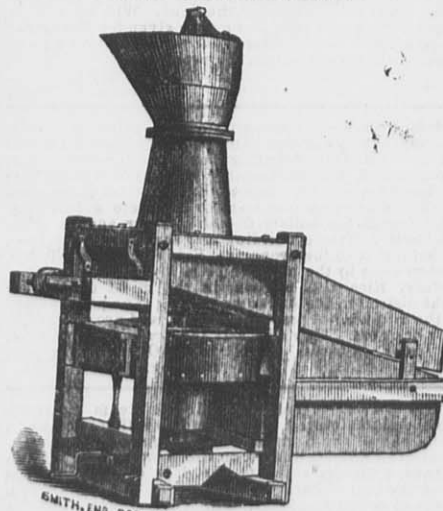
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**THE BEST QUALITY OF FRENCH BURR MILL-STONES.**

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## THE SILVER CREEK CORN SHELLE and CLEANER.



It is Adjustable while Running. It is Especially Adapted to Millers' Use. It has no Equal in the World.

MANUFACTURED BY

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ATTENTION! MILLERS! ATTENTION

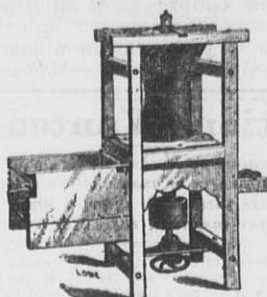


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This composition is put up in boxes sufficient to dress a four-reel chest, at \$5 per box. It will clean the cloth of all such pests as cause so much trouble in patching. It will not affect the flour nor damage the cloth, and is free from poison. For particulars send for circulars. Address JOHN WAYMAN, Cobden, Union Co., Ill.

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**Adjustable While Running** So as to shell corn of any size.

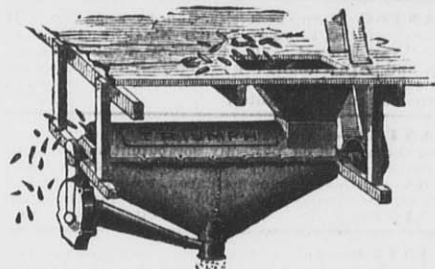
**WILL also CLEAN the SHELLED CORN.**

Send for descriptive circular.

R. P. WARD,

SILVER CREEK, CHAUTAUQUA CO., N. Y.

## TRIUMPH POWER CORN SHELLE!



Shells and Cleans 2,000 Bushels Ears per day.

The Cheapest, Best and most Simple Power Corn Sheller in use. Send for Circular and Price List.

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—OF—

**HENRY HERZER,**

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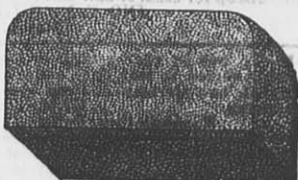
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I desire to call attention to the durability of MILL PICKS made and dressed by me. I manufacture them of the best ENGLISH STEEL, and warrant all work to give satisfaction.

I shall be pleased to receive your orders, as I always have a supply of New Picks on hand, and give particular attention to dressing Picks.

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**MILLER'S PATENT COMPOSITION BURR RUBBER.**

For Cleansing, Sharpening, and Facing Burrs, and Smoothing Furrows.

Warranted to produce a better grinding surface than the Pick or Diamond and save 50 per cent of labor in dressing Burrs and expense for tools. Face Rubber 10 x 6 x 3 in., weight 12 lbs., price \$3.00. Furrow Rubber, 10 x 6 x 1 1/4 or 1 1/2, 1 1/4 or 2 in., as required, price \$2.50 or both for \$5.00. Sent by express on receipt of price. Circulars free. Address all orders to the sole manufacturers, MILLER & MCCARTHY, Mount Union, Penn.

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Mill Furnishing, Foundrymen & Machinists. Established 1851. MANUFACTURE **MILL STONES.** Flouring Mill Contractors. Send for Pamphlet. Nordyke & Harmon Co Indianapolis, Ind.

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Plans and specifications made by accomplished Mechanical Engineers and Millwrights.

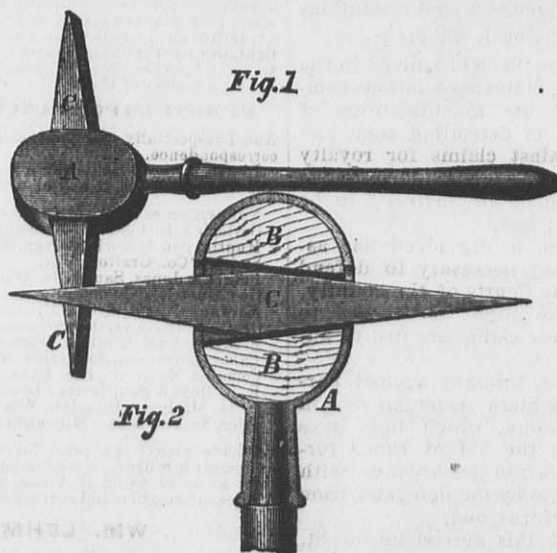
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The Pick can be adjusted at will to strike the Stone at any desired angle. We have constantly on hand a large assortment of our celebrated

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All numbers kept constantly in stock to supply the largest order at a moment's notice. Grit-Gauze Cloths equal in Mesh to 000 to number 6 inclusive always on hand.

**Flour Mill Trimmings a Specialty.**

Such as Rubber, Leather, and Solid Wove Cotton Belting, Elevator Buckets and Bolts, Bran Dusters, Wire Cloth, Plated Wire Cloth, Brass Wire Cloth, Water and Steam Gauges, Boiler Injectors, Pumps, Packing, Smutters, Corn Shellers, Portable Mills, &c., &c. And all necessary articles for Mills at prices to suit the times. Send in your orders.

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A DESCRIPTIVE AND EXPLANATORY ACCOUNT of the various grains, machinery, and processes used in grain mills. The first clear and successful explanation of said processes ever printed. It treats on and explains all the newest and most improved modes of manufacturing wheat, oats, barley and peas, introducing the three latter mainly with the views of illustrating the principles at work in the proper manufacture of the first. Such as the various modes of storing, cleaning and grinding wheat, and the effects on their proper working with the Baker, showing conditions which must be observed to make flour equal to Hungarian. The effects of the different styles of working mill-stones, rollers and disintegrators contrasted. Also the different modes of separation, including gold sifting, the revolving crank sifter, the shaker, the wire cylinder, the silk reel, the best mode of working the silk reel. Vertical and horizontal air currents, the effects of air currents contrasted with sifting. Altogether explaining clearly well defined principles which govern proper grinding and dressing, where too often all is doubt and uncertainty. And although extensively circulated in Britain the last 12 months, none has yet ventured in print, to controvert its solution of the most difficult problems in the milling business. And being the production of a miller who has been over much of the United States, it can be easily understood by American millers. Price sixty cents, sent post paid. Address all orders to B. Harrison Cawker, Editor of THE UNITED STATES MILLER, No. 62 Grand Opera House, Milwaukee, Wis., who is sole agent for America.